

THE  
AMERICAN NATURALIST.

VOL. XIV. — MAY, 1880. — No. 5.

THE STRUCTURE AND ACTION OF A BUTTERFLY'S  
TRUNK.

BY EDWARD BURGESS.

EVERY one knows that butterflies and moths, the insects forming the group Lepidoptera, often feed on honey, and that for the purpose of obtaining it, they are provided with a long trunk, or tongue as it is sometimes called, to reach the nectaries of flowers. Sometimes this trunk is very long, in the case of our common tomato caterpillar moth, for example, its length is three inches, while in some allied moths of tropical regions it is greatly longer, and botanists and entomologists have often pointed out the relation existing between the length of various long-tubed flowers and of the trunks of some species of moths in the same region.

Thanks to the acuteness of Savigny, entomologists have long known that this trunk is not an organ *sui generis*, but simply the metamorphosed *maxillæ*, or second pair of jaws of biting insects, which have become specialized to form a sucking tube. The mandibles or first pair of jaws, which, while the insect was in the caterpillar stage were well developed to bite off pieces of leaves or other substances then its food, are, in the perfect butterfly, reduced to the merest rudiments (Fig. 1, *md*), only to be found by carefully brushing away the thick covering of scales and hairs. The pair of *maxillæ*, on the contrary, grow each into a long, gently-tapering organ with a deep groove along its inner surface; which surface being applied to that of the opposite *maxilla*, and held in this position by a sort of dove-tailing lock, there is formed a hollow trunk through which liquid food can be drawn into the mouth.

When not in use the trunk is coiled into a close spiral, and lies beneath the insect's head, hidden between the large and hairy

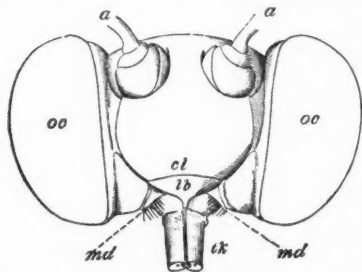


FIG. 1.—Face of *D. archippus*; *oc*, compound eyes; *a*, antennæ; *cl*, clypeus, *lb*, labrum or upper lip; *md*, the small mandibles armed on the inner edge with stiff bristles; *tk*, base of the trunk.

feelers of the lower lip—the labial palpi—which are specially developed for this service. Now although, as just said, these facts have long been known, the mechanism for sucking liquids through the trunk seems never to have been noticed, and it has been supposed that the power of suction lay in the “sucking stomach,” so called, or perhaps in the peristaltic contraction of the trunk, or that simply the capillary action of the latter might be sufficiently powerful to dispense with any special sucking apparatus. The anatomy of the trunk has been equally neglected and misunderstood. Thus even Burmeister believed that each half had a canal of its own, and Newport described non-existing horizontal muscles, and otherwise mistook the muscular mechanism.

Having been for some time engaged in studying the anatomy of the “emperor,” as Mr. Scudder has christened *Danaïs archippus*, our largest and very common butterfly, I will describe the mouth organs of this species, the same plan of structure prevailing through the whole group of Lepidoptera, at least wherever I have examined representatives.



FIG. 2.—Tip of trunk of *D. archippus* from outside, greatly magnified. The rings are really black and opaque, the intervening spaces delicate and transparent.

In the “emperor” then, the trunk is about fifteen millimeters long, with a width at the base of about  $\frac{2}{3}$  mm., from which it gradually tapers to a point at the tip. Externally a sort of coat-of-mail appearance is given by its composition of an immense number of rings (Fig. 2) (or rather portions of rings, the inner segments being of course wanting)

which being united by more yielding parts of the cuticle, evidently permit the rolling up of the whole organ, while imparting at the

same time the necessary stiffness. The rings are not perfectly regular, but vary in width and are here and there broken, or branch and anastomose.

Figure 2 shows a few of their irregularities, but they are less apparent at the tip than higher up. With a strong magnifying power the rings are seen to be made up of little plates<sup>1</sup> soldered together, except on the front surface near the inner edge of the maxilla, where the plates become separated and more or less hexagonal. Dotted over the whole surface, but more thickly at the tip, are seen little circular plates with a minute transparent papilla in the center. These are believed to be metamorphosed hairs, and in some butterflies and moths become greatly and peculiarly developed,<sup>2</sup> and are supposed by Fritz Müller to be organs of the sense of taste or touch, perhaps both. Breitenbach, however, thinks they play the part of teeth on a saw or file, and serve to tear the delicate flower tissues for obtaining the sweet

juices contained in them. In the famous orange-sucking moth (*Ophideres fullonica*), which sometimes greatly damages the orange harvests, Mr. Francis Darwin<sup>3</sup> has described the remarkable arma-

ture at the tip of the trunk, which enables the moth to pierce even the thick skin of an orange, and one set of the curious spines in this case are simply our small papillæ much developed and specialized. These

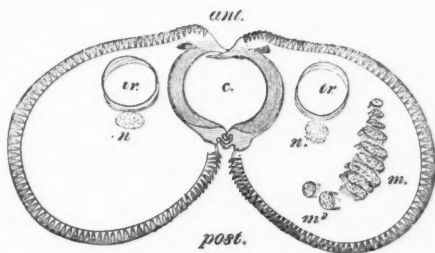


FIG. 3.—Transverse section of trunk showing the two maxillæ united by the dove-tail joint, and forming the interior canal, *c*; the air tubes, *tr*; *n*, nerve; *m* and *m*<sup>2</sup>, the two sets of muscles, probably more or less displaced in the cutting; these are omitted in the left maxilla.

<sup>1</sup> By examining Figs. 3 and 4 it will be evident that these plates are the bases of little pyramid-shaped bodies (in some regions more like stout nails or tacks) which are imbedded in, or rather specialized portions of, the cuticle. Three of these are shown in the annexed figure, 3 *B*, where *cu* is the cuticle, plainly laminated, and *hy* the underlying matrix or hypoderm. It is not improbable that each pyramid corresponds to a single cell of the hypoderm.



<sup>2</sup> See papers by Breitenbach in Katter's Entomol. Nachr., v, 238, and in the Arch. Mikros. Anat., xv, 8 and xvi, 308.

<sup>3</sup> Quart. Jour. Micr. Sci., xv, 385.

hair structures in the emperor, however, are not prominent enough, one would think, for mechanical action, and in this and similar cases, their function is probably wholly that of touch or taste. This view is strengthened by their occurrence also *within* the tube, where they appear, but in lesser numbers.

If we imbed the trunk in a mass of paraffine or soap,<sup>1</sup> and cut some thin transverse sections, we shall obtain with the microscope a view of its structure as seen in Fig. 3. Each half of the trunk, that is, each maxilla—has a sort of moon-shaped section, the lower horn of which is snugly dovetailed to the lower horn of the opposite half, while the upper horns are drawn out into long processes, which simply interlace like the fingers of one hand with the other. There is thus inclosed a central canal open from base to tip of the trunk, and its walls are made up of broad but thin, semicircular plates, whose narrow edges give the canal wall, seen

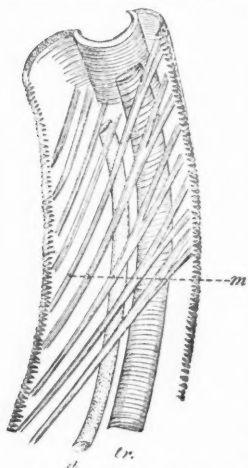


FIG. 4. — Longitudinal section of trunk; the canal, *c*, is shown above; lower down the trachea, *tr*, and the nerve, *n*; while the diagonal muscles, *m*, overlie them. These are spaced somewhat wider than in nature, for the sake of clearness. The right edge is the outer one.<sup>3</sup>

from the side, much the appearance of a large trachea, or air-tube (Fig. 4, *c*). Each half of the trunk also contains a real air-tube (*tr*, Figs. 3 and 4), a nerve (*n*) and two sets of muscles (*m*<sup>1</sup> and *m*<sup>2</sup>), while the rest of the space is filled out with connective tissues.

It has generally been believed<sup>2</sup> that the trunk is extended by muscular action, being rolled up in repose by its own elasticity, like a watch-spring, but the trunk muscles seem, at first sight, to be arranged for just the opposite state of things. They are grouped in two sets in each half of the trunk, each set arising on the anterior surface, and proceeding diagonally downward and backward to be inserted on the posterior surface. They converge too, in this course, so that, viewed from in front, the two sets of muscles form a series of V's one above the other. One of the sets is seen in the vertical section of the right maxilla (Fig. 4), and if we examine this

<sup>1</sup> See directions given by Dr. C. S. Minot in the *NATURALIST* for April, 1877.

<sup>2</sup> This is the statement of the latest text-book, that of Graber, *die Insecten*, I, 156.

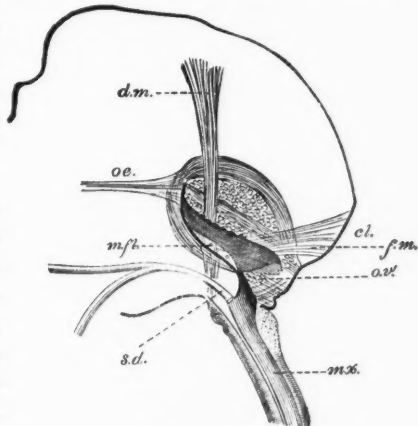
<sup>3</sup> The cross sections of the rings forming the edges of the figure are engraved as much too irregular. The inner boundary of the cuticle is also omitted.



figure, it would seem that by the contraction of the muscles, the posterior side of the trunk is pulled upwards, and of course shortened, and the shortening taking place along the whole side, the result would be the spiral rolling up of the trunk, with the posterior side within the coil. These diagonal muscles are the only ones to be found, and Newport certainly errs in speaking of annular muscles. On the view of the muscular action just taken, it is evident that the trunk must be unrolled and extended by its own elasticity, and not the reverse, a theory which is certainly very questionable, but at present I am unable to offer a better, and must leave the point to the decision of future investigators. Certainly no writer I have found has thrown the least light upon the subject, or even given a correct general description of the muscular arrangement.

At the base of the trunk large muscular bands run into it from the head in a diagonally opposite direction to the trunk muscles, and are inserted on the anterior surface. Their contraction of course pulls the whole trunk-coil closely up under the head.

Following now the trunk canal upwards into the interior of the butter-



fly's head, we find (Fig. 5) that it ends in what we may here call a mouth cavity, which is laterally expanded, but has no great diameter from front to back, that is, from palate to floor. The mouth cavity lies in a muscular sack (Fig. 6, seen from above), which is suspended within the head by five muscles, a lateral pair (*lm*), a dorsal pair (*dm*) and one frontal (*fm*). This oral sack is composed of muscular fibres running in a variety of directions as will be seen in Fig. 5; Fig. 6 shows the exterior appearance of the organ and its suspending muscles; the slender

FIG. 5.—Longitudinal section through the head giving a view of the interior of the left half; *mx*, the left maxilla whose canal leads into the mouth cavity; *mf*, floor of the latter showing some of the papillæ of taste; *oe*, oesophagus; *cl*, clypeus; *ov*, oral valve; *sd*, salivary duct; *dm* and *fm*, a dorsal and the frontal muscles which hold the oral sack in its position.

œsophagus (*œ*) is seen entering it from above and behind. From the palate, just above the origin of the trunk, projects a triangular muscular flap, which we may call the oral valve (Fig. 5, *ov*) as it serves to close the mouth.

The floor of the mouth is made of a thick chitinated crust, with a longitudinal furrow between two convex regions; the floor thus somewhat resembles in shape the human breast. Each convexity is dotted over with minute transparent papillæ, which are, in general, similar to the papillæ already described, on the surface of the trunk. It seems highly natural to regard the papillæ, in this situation at least, as taste organs, but I have not succeeded in recognizing their nervous connection.

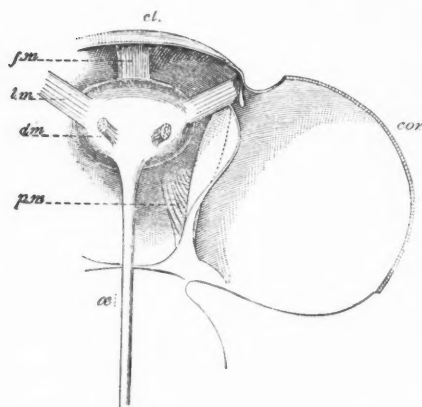


FIG. 6.—Interior view of the bottom of the head, the top having been cut away, showing in the middle the oral sack hung by its five muscles—the frontal, *fm*, the dorsal pair, *dm*, and the lateral pair, *lm*; *cl*, clypeus; *cor*, cornea of the compound eye (the left eye is not drawn); *œ*, œsophagus; *pm*, one of the large muscles which move the labial palp.

The palate of the mouth, unlike the floor, is lined with a delicate membrane. The suspensory muscles of the oral sack pierce the muscular wall of the latter and reach the palatal membrane. Their contraction would evidently draw the palate away from the floor of the mouth, thus enlarging its cavity. At the base of the trunk, on its lower surface, the common duct (*s d*) of the two lateral salivary glands opens as is shown in Fig. 5.

From the anatomy of these parts we may understand that the butterfly obtains its food in the following manner: The trunk is unrolled and inserted in the nectary of a flower; at this moment the muscles which suspend the oral sack contract, and the mouth cavity is thus extended, creating a vacuum which must be supplied by a flow of honey through the trunk into the mouth. When the mouth is full the muscular sack contracts, the oral valve closes the aperture to the trunk and the honey is forced

backward into the œsophagus. The mouth cavity is then again opened and the same process repeated. To prevent the food being sucked back from the œsophagus, it is probable that some of the numerous fibres in the muscular sack near the origin of the former can, by contraction, close its opening, but in any case as the trunk presents a free tube, and the œsophagus leads into the closed alimentary canal, it is evident that the former offers the easiest route for a supply to fill the mouth vacuum.

In the muscular mouth sack, we have thus a pumping organ, of action too simple to be misunderstood. As for the so-called "sucking stomach," its delicate membranous structure is certainly not adapted for sucking functions, and it probably serves only as a reservoir. It is usually found to contain nothing else than air, but Newport asserts that immediately after feeding food is also found in it.

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## THE CRITICS OF EVOLUTION.

BY J. S. LIPPINCOTT.

THERE is a large class of minds even among those who esteem themselves educated, who have no acquaintance with science and another, perhaps equally large, who have no idea of what is meant by the scientific spirit. These all imagine, perhaps, that the world of things or phenomena around them, has ever been pretty much as it now appears to the superficial gaze, and that men have always known about as much about the earth, its origin, development and productions, as they now know. They appear to be unconscious of the fact that a century ago we knew almost nothing of the constitution of matter, and were holding the same crude and puerile ideas about nature that were held by the ancients 3000 years ago. They do not seem to be aware that but few conquests, from the domain of the unknown had been made in physical astronomy, and that almost all our knowledge of the composition of the earth and its myriads products, animal, vegetable and mineral, have not yet been reached.

A century ago the simplest phenomena were inexplicable ; no

man knew why he breathed, or why a candle burned; why a plant grew; what use a leaf served; what the air is composed of; or that water is a compound fluid. A century ago, many more than even now-a-days, were perfectly indifferent as to the nature of things around them, regarding them, shall we say, with brute "unconscious gaze."

Why this ignorance of nature? The science of chemistry, a new revelation of the wisdom of the Creator, had not yet dawned upon the childhood of ignorance. When men began to question nature in the scientific spirit, began to weigh and measure and to question again and again while doubt rested upon her replies, they entered upon the path of discovery. This path has since been ardently pursued by hundreds of minds, qualified for the noble task of explaining His ways in the earth, by elucidating the method He is employing daily around us and within us, and by which He has ever been laboring for the good of His creatures. By following the path of research, accumulating facts, collating them, and constructing theories that would most fully account for the interdependence of the phenomena observed, man has penetrated into the mysteries of creation and in some directions already stands almost upon the brink of "the unknowable," beyond which it is impossible for finite minds to go. As each grand generalization has prepared him to take a new stand-point, and from thence to obtain a wider view of natural phenomena, his conceptions have become more comprehensive, until he may yet grasp the origin of the universe and ~~been~~ enabled to understand the laws by which it was condensed from the all pervading nebulous condition which has been termed chaos.

Many we are aware denounce theories as vain imaginings; but such should learn that a theory is but an expression of the relations of phenomena, a condensed presentation of all the facts in their natural order, and that it is by this artificial memory the enquirer is enabled to grasp his attainments, and to be lifted up as by a scaffolding for the more thorough study of new phenomena, otherwise incomprehensible, and for the construction of a building which shall embody all the truth. Theories, let it be understood, are always tentative, always a working apparatus, to be remodeled as knowledge advances, and indispensable to its progress. Theories are not, as many suppose, the offspring of imagination purely, but are like a figure cast within a mold, or like a casting perfectly

shaped thereon. The mold upon which theories are formed is the mass of facts observed in their just relations, as far as man has yet discovered and determined.

Emboldened by his success, the man of science is pursuing the path of discovery, convinced that though there may be many things beyond his comprehension, there is nothing that he should consider beyond his enquiries. Bacon in his "Advancement of Learning," sagely advises, "Let no man out of a weak conceit of sobriety, and an ill-applied moderation, think or maintain, that a man can search too far, or be too well studied in the book of God's word or in the book of God's works; divinity or philosophy; but rather let men endeavor an *endless* progress or proficiencie in both." It is in the highest degree probable that the Creator designed he should follow this path, both for the further development of his intellectual powers and for the promotion of the cause of truth and righteousness in the earth. It is evident that our enlarging conceptions of creative power, widen the avenue through which we receive impressions of the Divine glory, and that the views of the educated modern scientist are infinitely expanded beyond the narrow confined range of the ancients. His new and grander generalizations of knowledge are indeed so many wonderful revelations of the Creator, who, as it were, thus speaks almost face to face with man.

Unfortunately many minds, especially those of purely theological bias, appear to be incapable of comprehending the value of the grand results that have followed scientific research. They hastily dismiss them, with the remark—all these researches are merely material—"of the earth, earthy," and beneath the consideration of beings living in a spiritual world and destined to an eternity of spiritual existence. This estimate of the importance of the labors of men of science, whose studies have given us almost all the comforts and invaluable appliances that have lifted us above our semi-civilized ancestors, appear to us, to be a very unworthy and very superficial view. The progress of civilization is intimately connected with, is indeed dependent upon, advance in the useful arts, which are founded directly upon science, and to reject science and condemn its advocates, is to spurn one of the chief factors in the work of human elevation.

Among the grand generalizations or results of the labors of naturalists of recent date, is that entitled Evolution, which is in-

deed the noblest product of a century of scientific thought; the top-stone of the intellectual building that man has been erecting.

*Scientists falsely assumed to be Atheists.*—Though it is not a part of the mission of science to explain or even to discuss the supernatural, philosophers readily admit, that all *real origination* is supernatural. The question is whether they have yet gone back to the origin, and can assert indubitably, that the present forms of plants and animals are those originally created by miraculous exercise of power. Studying facts and phenomena in reference to proximate causes, or endeavoring to trace back the series of causes and effects as far as possible, is a process strictly scientific and perfectly legitimate. It is the process of all science. Did not Newton, by this method, rise from the observation on the fall of an apple, to the far-reaching discovery of the laws of gravitation? Let it be observed also as in the highest degree instructive in this connection, that Newton, the pious Sir Isaac, the demonstrator of the truth of prophecy, a sincere and humble believer in the leading doctrines of our religion,—was because of his demonstration of the laws by which the universe is sustained, pronounced by the ignorant and unwise ultra-pious of his day, *an atheist*.<sup>1</sup> They hastily assumed that, because the philosopher had traced the working of the Divine hand, had demonstrated the method by which He labors, that God had been shut out of the creation. Here is something more foolish than any philosophy, and paralleled only by the reasoning of our champion Anti-Evolutionists.

The path pursued by Newton is that followed by Darwin, who has adhered to the scientific spirit, deeming the task of science to be, as expressed by Agassiz, "to investigate what has been done, to inquire if possible *how it has been done*, rather than to ask what is possible for the Deity, since we can know that only by what actually exists." Though Darwin has not deemed it his duty to become an exponent of natural theology, *he has emphat-*

<sup>1</sup> The list of those who have been denounced as infidels and atheists, include almost all great men of science—generals, scholars, inventors, philanthropists. The deepest Christian life, the holiest Christian character, have not availed to shield the combatants. Christians like Sir Isaac Newton and Pascal, and John Locke and John Milton, and even Howard and Fenelon, have had these weapons hurled at them. "*The Warfare of Science*," by Andrew D. White, LL.D., President of Cornell University. See also lists of persons charged with infidelity and atheism in "*Le Dictionnaire des Athées*," Paris, An. VIII. (1799)

ically contradicted the base charge brought against him that "he does not recognize and does not admit either Divine agency or Divine supervision in furnishing, or in peopling the world." This view is nowhere expressed in his books. I believe he nowhere uses the phrase "fortuitous conjunction of circumstances," which some of his critics "roll as a sweet morsel under their tongues," nor can his language "natural selection" be rightly construed to mean any such fortuitous conjunction;" nor does he "sneer at the idea of any manifestation of design in the material universe." Darwin maintains that the origination of a *species*, no less than that of an *individual* is *natural*. He has also defined his meaning of the word *natural*, and asserts, choosing the language of the distinguished Bishop Butler, whom none will deny was thoroughly orthodox,<sup>1</sup> "The only distinct meaning of the word '*Natural*,' is, stated, fixed, or settled, *since what is natural as much requires and presupposes an intelligent agent to render it so—that is—to effect it continually or at stated times—as what is supernatural or miraculous does to effect it for once.*"

This passage from Butler Darwin has placed at the very portal of his work "The origin of species by means of natural selection or the preservation of favored races in the struggle for life,"—upon the reverse of the title page, where it should be the first to meet the eye of the reader.

Here is an emphatic acknowledgment of belief in Divine agency, a recognition of intelligent supervision throughout the "processes of evolution." It is no part of our mission to account for the vagaries of the critics friendly to Darwin, who have misconstrued his principles. He must speak for himself, and he has here spoken in unmistakable language.

*Evolution Generally Accepted.*—Few of the objections that sprang into life the moment the doctrine of development was proposed for our acceptance, now give evidence of persistent vitality. Time has consigned, or is consigning, them to oblivion, and "evolution is taking its place as part of the furniture of the human mind."

<sup>1</sup> "Analogy of Religion natural and revealed to the constitution and course of nature," by Joseph Butler, Lord Bishop of Durham. This passage appears in chap. I of Part I. on Natural Religion, on p. 105 of Harper's edition of Bishop Butler's *Analogy of Religion*, &c. The following succeeds it in order and is quite pertinent to the present discussion. "And from hence it must follow, that persons' notions of what is natural will be enlarged, in proportion to their greater knowledge of the works of God and the dispensations of His Providence."

Like other accepted theories, evolution is the natural growth of closer and deeper observation, and therefore of more accurate knowledge of the relations of facts. The doctrines of evolution have been reached in the perfectly legitimate manner by which all the other great truths of science have been discovered. It has been a natural outgrowth from facts, and is not, as some suppose, an invention sprung from the imagination of a dreamer. It is one department of "that science which is but common sense methodized and extended," and "is indeed the highest stage of human knowledge."

It has appeared to us to be a reasonable opinion that any one endowed with the scientific spirit would not go to a theologian to obtain a just estimate of the value of a scientific theory, but would visit an enlightened expert for an opinion. "The former class continually labor to make tradition confront discovery and feel constrained to view with jealous distrust the rapid advancement of practical knowledge." Their inquiries are not whether any new fact is absolutely true, but whether it is in accordance with conceptions they consider established. Those who really desire to learn what evolution is, and its profound significance, and are possessed of the proper faith in nature as a revealer of intellectual truth, will not consult Joseph Cook's "Biology," the scientific charlatanry of which has been thoroughly exposed in the *New Englander* for January, 1879, where its taste and rhetoric have been pronounced "execrable," and which in the *Saturday Review* is the subject of an article entitled "*Spread Eagle Philosophy*." With his religious sentiments properly, we have no controversy. Nor would they look with any confidence upon the objections of writers whom they should no more regard as authority on scientific questions than they incline to accept their views on theology. Dr. Hodge, of Princeton, has been well answered by Dr. Gray in his "Darwiniana,"<sup>1</sup> to which I would refer the reader. One of his remarks may as well here be reproduced; "It may be well to remember that of the two great minds of the 17th century, Newton and Leibnitz, both profoundly religious as well as philosophical, one produced the theory of gravitation, the other objected to that theory, that it was subversive of natural religion; also that the nebular hypothesis, a natu-

<sup>1</sup> What is Darwinism? by Charles Hodge, Princeton N. J. By Asa Gray in his *Darwiniana*, pp. 266-282, and pp. 137-258.



ral consequence of the theory of gravitation and of the subsequent progress of physical and astronomical discovery, has been denounced as atheistical even down to our day. It has now outlived anathema," and is no longer rejected even by theologians.

Dr. Asa Gray acknowledges that Darwin in his style is loose, and that he might have been more guarded had he chosen to be so. Dr. Gray, however, acquits him of all atheistic intent, and remarks that his view may be made clear to the theological mind by likening it to that of the "believer in the general but not in particular Providence," a view which prevails among mankind.<sup>1</sup> There is no need, says Gray, "to cull passages from his works to support this interpretation, while the author—the most candid of men—retains throughout all the editions of the "Origin of Species," the two mottoes from Dr. Whewell and Bishop Butler, which, by implication, entirely acquit him of atheism.

It may be well to quote the passage from Dr. Whewell, the able author of "A History of the Inductive Sciences;" that from Butler has already been adduced: "But with regard to the material world, we can at least go so far as this—we can perceive that events are brought about not by insulated interpositions of Divine power exerted in each particular case, but by the establishment of general laws." (Whewell's Bridgewater Treatise.)

Another extract from Dr. Gray we will present the reader. In physical and physiological treatises, the most religious men do not think it necessary to postulate the First Cause, nor are they misjudged by the omission. But surely Darwin does acknowledge a Creator, not only by implication but most explicitly where one would most naturally look for it, namely—at the close of the volume in question. "Authors of the highest eminence seem to be fully satisfied with the view that each species has been independently created. To my mind it accords better with what we know of the *laws impressed on matter by the Creator*, that the production and extinction of the past and present inhabitants of the world, should have been due to secondary causes, like those determining the birth and death of the individual" \* \* \*

"there is grandeur in the view of life, with its several powers, having been *originally breathed by the Creator* into a few forms, or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless

<sup>1</sup> Darwiniana, p. 258.

forms most beautiful and most wonderful have been and are being evolved."<sup>1</sup> "If these expressions," says Dr. Asa Gray, "do not refer the efficiency of physical causes to the First Cause, what form of words could he use."<sup>2</sup>

*The Teleology of Evolution.*—One of our objecting critics forgets that he is quoting from an old work of Huxley's, where he says "that which struck me most forcibly was the conviction that teleology (the science of Final Causes) had received its death blow at Darwin's hands."

To the above I may reply, following Dr. Gray and other able defenders of Darwinism, that as regards the old teleology, the less said in its defense the better for the cause of religion. The difficulties which its principles will not explain are many and serious.<sup>3</sup> Darwinian teleology has the special advantage of accounting for the imperfections and failures which have loaded the doctrine of teleology with far more than it could bear. The Darwinian teleology not only accounts for the failures and the successes, but it turns them to practical account. In Darwinism we have a teleology that accords with, where it does not explain, the principal facts, and is free from the common objections. The Darwinian system, as we understand it, coincides with the theistic view of nature; it not only acknowledges purpose, but builds upon it. It understands all nature to be of a piece, and it is clear, therefore, that design is in some way mixed up with it. If adaptation and utility are the marks of design, what then, we would ask, are the organs not adapted to use the marks of?—and there are numerous functionless organs in almost every species of animal. Man has sundry perfectly useless parts which the old teleology cannot account for, and which are great stumbling blocks in the way of the olden style natural theologians. But evolution shows their true place and *demonstrates that these structures are relics of a former state of being*. "It is," says Haeckel,<sup>4</sup> precisely this widespread and mysterious phenomenon of rudimentary organs, in regard to which all other attempts at explanation fail, which is

<sup>1</sup> "On the Origin of Species by means of Natural Selection," &c. By Charles Darwin. New York, 1873. New edition from the sixth English edition, &c., pp. 428, 429.

<sup>2</sup> Darwiniana. By Dr. Asa Gray. Pages 370, 378, 379.

<sup>3</sup> Darwiniana. By Dr. Asa Gray. Pages 268, 269.

<sup>4</sup> "The History of Creation; or the Development of the Earth and its Inhabitants by the action of Natural Causes," by Ernst Haeckel. 1876. Vol. 1, p. 16.

perfectly explained, and indeed in the simplest and clearest way, by Darwin's 'Theory of Inheritance and Adaptation.'

These remarks could be greatly extended, with vivid demonstration, but I must content myself with referring to an admirable popular work by William D. Gunning, entitled "*Life History of our Planet*," where one may learn that the human body is a "library of anatomical history." Finally, I adduce the testimony of Dr. McCosh, an unimpeachable witness, who asserts that, "the doctrine of development does not undermine nor in any way interfere with the argument from design."<sup>1</sup>

*Dissent of Agassiz.*—Much stress has been placed upon the dissent of Agassiz and Dawson from the views of the evolutionists, and they are quoted as veterans who of course we are bound to regard as speaking *ex cathedra*, and therefore not to be gainsayed. "Have any of the rulers or of the Pharisees believed on him? was asked of old," and some critics ask the same question and forget that it is recorded of Christ, "For neither did his brethren believe in him." What to the seeker for truth does it matter now or did it matter then, who believed or now believes? The votaries of science are not swayed by authorities but by truth. Their motto should ever be, "Nullius addictus jurare in verba magistri." The opinions of aged men, unless they have kept themselves abreast of the thought of the day, are frequently unwise, and are seldom regarded by those who prefer to seek truth for its own sake regardless of the reflections of Mrs. Grundy. "By the time," I have heard a most eminent man of science observe, "by the time a man of science attains eminence on any subject he becomes a nuisance upon it, because," if advanced in age, "he is sure to retain errors which were in vogue in his youth, but which the new race has refuted. These are the sort of ideas that find their home in *Academies*, and out of their dignified windows pooh-pooh new things." (Bagehot's *Physics and Politics*, p. 60.)

Science enjoys perpetual youth. Her votaries grow old and pass away, and their opinions with them, unless founded on eternal principles. "Her goal to-day is her starting point to-morrow." It is an historical fact that no physician over forty years of age at the time of the discovery of the circulation of the blood

<sup>1</sup>"Is the *Development Hypothesis* Sufficient," by Dr. James McCosh, President of Princeton College. Published in the *Popular Science Monthly*, Vol. x, p. 96.

by Harvey, ever believed in that discovery. Why did they not believe in it? Because it was not in accord with their inherited prejudices, with the experience of their lives, and their personal pride scouted at the discovery, by a young man, of valuable facts that they ought themselves to have seen long ago, were they true. Thus it was with Agassiz, who ought to have seen the truth of evolution long ago, for he contributed a large body of material for the verification of the theory. His embryological discoveries offer conclusive evidence of its truth. This his pupils saw, but their master, blinded by his Cuvierian education and belief in distinct specific creations, could never reach the truth, though dissatisfied with the hypothesis of creation as recorded in Genesis. He published a theory of distinct creations in many separate geographical centers, and was, therefore, quite heretical. The doctrine of evolution covers all this ground more satisfactorily, and his theory is disregarded. Why was this master in research incapable of impressing his views upon his pupils, with whom he was personally so popular? Because young and unprejudiced they sought truth for its own sake, and loved it better than even they did their admired teacher. His opposition to Darwinism, they now openly assert, served to make them more careful in their scrutiny into its weak points as described or imagined by him, and he was thus of real service in training his pupils for the adoption of the doctrine of evolution. "Of all the younger brood of naturalists whom Agassiz educated, every one—Morse, Shaler, Verrill, Niles, Hyatt, Scudder, Putnam, even his own son—has accepted evolution." (*Popular Science Monthly*, Feb., 1880.)

In direct opposition to palæontological experience, that many species of organic beings have continued unchanged through successive periods of the earth's history, while others have existed during only a small portion of such a period, Agassiz maintained that one and the same species never occurs in two different periods, but that each individual period is characterized by species peculiar thereto and belonging to it exclusively. In this he shares Cuvier's opinion that all the inhabitants of successive geological formations were annihilated by the revolutions which divide two periods of the earth's palæontological history, and that a new and specifically different assemblage of organisms was created and suddenly placed upon the earth in large numbers by the Creator. "Pines," says Agassiz, "have originated in forests,

heath in heather, grasses in prairies, bees in hives, herring in shoals, buffaloes in herds and men in nations."<sup>1</sup>

The present terrestrial fauna of Australia is acknowledged to be unique, and is it not essentially a remnant of the fauna of the Jurassic or even of an earlier age? "There is a wonderful relationship," says Darwin, "in the same continent between the dead and the living." On the hypothesis of evolution there is no difficulty in admitting that the differences between the Miocene forms of Mammalia and those which exist at present, are the results of gradual modification. "The hypothesis of evolution explains the facts of Miocene, Pliocene and recent distributions," says Huxley, "and no other supposition even pretends to account for them."

The division of the Tertiary into Eocene, Miocene, Pliocene and Post-pliocene according to the preponderance in number of extinct or recent shells, evidently admits that many species have persisted through the changes that have destroyed others.

The late T. A. Conrad, a pronounced opponent of evolution, asserts in his "Descriptions of new Genera and Species of Fossil Shells of North Carolina,"<sup>2</sup> that "it is a generally received opinion that some species of Miocene shells escaped the destruction of the general fauna," and that "the small amount of variation, and in some species none at all, seems to indicate that some few kinds of shells are now living which originated in the Miocene period." "Among these shells, the *Oliva litterata* (Lam.) lives in myriads in Tampa bay, whilst there is a Miocene *Oliva* equally abundant in the bank of Cape Fear river, which offers no characters by which to distinguish it from that fossil species." The same remark is made respecting the fossil *Marginella limatula* (Conrad), a species living on the coast of South Carolina, while he suspects identity of the fossil and the living may be shown to exist among many other species.

In his paper on "The Relations of the Horizons of Extinct Vertebrata of Europe and North America," Prof. E. D. Cope has shown that "the characteristic of the Pliocene fauna in Europe is the fact that the species belong mostly to existing genera." "In the *Equus* beds of Oregon, a few extinct genera in like manner share the field with various recent ones, while not a few of the

<sup>1</sup> Essay on Classification. Contributions to Natural History of the United States. By L. Agassiz. Vol. 1. p. 39.

<sup>2</sup>"Report of the Geological Survey of N. Carolina," by W. C. Kerr. 1875. Appendix A, p. 24.

bones are not distinguishable from those of recent species." Thus the bones of the fossil beaver and wolf cannot be distinguished from those of the recent, while they are also associated with the remains of an extinct fossil elephant, horse and llama. The species derived from the cave formations of the Eastern States, which Cope names the *Megalonyx* beds, also present many instances of extinct species mixed with the remains of those represented by the living ground-hog, porcupine, hare and rabbit and from which they cannot be distinguished.

In further illustration of this error of Agassiz, we may also cite the continued existence of the *Lingulæ*, formerly included among mollusks, but now shown to be allied more closely to worms. The *Lingulæ* were numerous and important in earlier geological ages and have been continued almost from the dawn of life and as they exist in the primordial "are scarcely to be distinguished as even Prof. Dawson acknowledges<sup>1</sup> from those of the members of the genus which still live." The original *Lingulæ* were remarkable for the presence of phosphate of lime in their shells, a peculiarity not found in the shells of mollusks generally, which are hardened by the presence of carbonate of lime. The modern *Lingulæ* present the same peculiarity and exhibits the wonderful persistence with which they adhere to the original type.

It was the merit of Agassiz that he drew especial attention to the remarkable parallelism between the embryonal and the palæontological or the development through time and the development of organic species, genera and tribes, which is claimed as one of the strongest pillars of the theory of descent or of evolution. No one before had so distinctly stated as Agassiz did, that of vertebrate animals, fishes alone existed at first, that amphibians came next, and that birds and mammals appeared only at a much later period, and moreover that among mammals, as among fishes, imperfect and lower orders had appeared first, and more perfect higher orders at a later period. He thus showed that the palæontological development of the vertebrates was not only parallel with the embryonic, but also with the systematic development or the graduated series which we see everywhere is ascending from the lower to the higher classes, orders, &c. *Haeckel*. This doctrine is explained quite simply and naturally by the doctrine of descent, or a historical succession, and without it, is perfectly in-

<sup>1</sup> "The Story of the Earth and Man," by J. W. Dawson. 1873. p. 41.

explicable. "So far as Agassiz's work, entitled 'An Essay on Classification,' pretends to be a scientific history of creation, it is undoubtedly a complete failure."<sup>1</sup>

We are indebted to a paper entitled "Agassiz and Darwinism," by John Fiske, in the *Popular Science Monthly*, Vol. III, for most of the following remarks upon the cause of Agassiz's inability to perceive the truths of evolution.

The frequency with which the name of Agassiz has been brought before the American people through his contributions to geology, palæontology and systematic zoölogy, has rendered his name very popular, and given rise to the opinion that he was the greatest of naturalists. He by right occupied a very high position, but no exceptional supremacy can be rightly claimed for him. Both for learning and for sagacity, the names of Asa Gray, Prof. Wyman, Huxley, J. D. Hooker, Sir Charles Lyell, Ernst Haeckel and Gegenbauer, are quite as illustrious as the name of Agassiz, and these are the names of men who openly endorse and defend the Darwinian theory. Many imagine that because Agassiz studied extinct and living organisms through a life-time of research, that his opinions with reference to the relations of present life upon the globe to past life, ought to be conclusive. The distinguished Darwinian naturalists above named, are equally well qualified to form an opinion, and have arrived at conclusions diametrically opposite to those taught by Agassiz. Why this result? Not because Agassiz did not possess the power of philosophizing, but because he philosophized on unsound principles. He erred because his philosophy was not the natural outgrowth from the facts of nature, which lay at his disposal, but is made up out of sundry traditions of his youth, and because he long ago brought his mind to acquiesce in various generalizations of a thoroughly unscientific or non-scientific character, the further maintenance of which appeared to him to be incompatible with the Darwinian theory. He also evidently arrived too early at that rigidity of mind which prevents us from properly comprehending new theories, and which we should all of us dread as a real evil. It has been broadly asserted by a learned writer familiar with the Darwinian controversy, that he has never met with any indication that Agassiz knew what the Darwinian theory really is! "Against a development as it was taught forty years ago he was fond of

<sup>1</sup> "The History of Creation," by Ernst Haeckel. Vol. I., p. 70.



uttering his expressions of dislike, but with the modern development theory he never betrays the slightest acquaintance, but contents himself with making profoundly dark metaphysical phrases do the work which properly belongs to observation and induction."

[To be continued.]

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### HALL'S SECOND ARCTIC EXPEDITION.<sup>1</sup>

OF the many men who have won fame in Arctic exploration, none have manifested greater heroism and perseverance than Charles Francis Hall. His ardent faith, which persuaded him to believe in the existence of some member of the lost expedition of Sir John Franklin at as late a period as twenty years after the abandonment of the *Erebus* and *Terror*, sustained him amidst the perils and hardships and disappointments of nearly eight years of life amongst the Esquimaux. Alone, with very slender means, he was yet able to obtain much important information regarding the fate of the officers and crews of that most unfortunate expedition, and to add materially to our geographical knowledge of the regions bordering upon the Cumberland gulf and the Bay of Hudson.

The story of his last voyage in the *Polaris*, and his death at almost the furthest Northern point yet reached by explorers is well known. Of his first journey, in 1860-62, to the Cumberland gulf and Frobisher's bay, he has given us a full account in his "Arctic Researches." But until now no account has been given to the public of his longest and most successful journey. This occupied a period of five years and six months, and upon his return home he began immediately his preparations for his North Polar expedition, and was unable to prepare an account of his travels. Fortunately his journals and notes, mostly carefully made and preserved, were in the possession of his family, and were purchased from them by the Navy Department under an

<sup>1</sup> Narrative of the Second Arctic Expedition made by Charles F. Hall. His voyage to Repulse bay, Sledge Journeys to the Straits of Fury and Hecla and to King William's Land, and Residence among the Eskimos during the years 1864-'69. Edited under the orders of the Hon. Secretary of the Navy by Prof. J. E. Nourse, U. S. N. U. S. Naval Observatory.



Act of Congress, and these, with his private correspondence, form the basis of the narrative now published by the National Government.

Prof. J. E. Nourse of the Naval Observatory, who, upon the death of Admiral Davis, completed for publication the "Narrative of the North Polar Expedition," was ordered to prepare this work, and has performed the duty assigned him most successfully, showing wise discrimination in the condensation and selection of the material laid before him, and great industry and careful



Ebierbing.



Too-koo-li-too.

research in the collection of information relating to previous Arctic explorations.

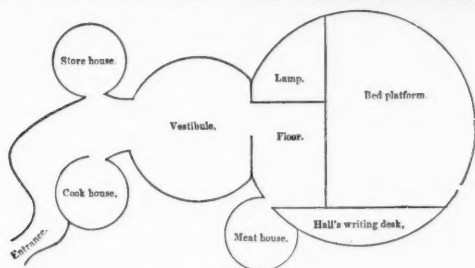
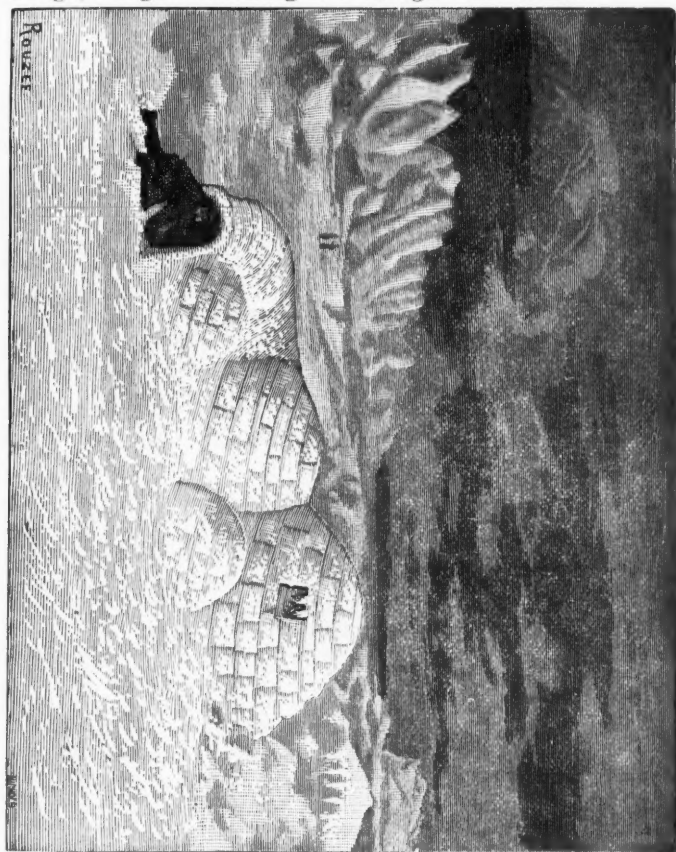
In a preliminary chapter, tables are given showing all the English and American explorations for the north-west passage, from 1818 to 1845, when Sir John Franklin's expedition left England, and also the English and American Franklin relief expeditions from 1848 to 1860, and mention is also made of the geographical and scientific results of these voyages. There is also

an interesting account of two voyages made from Philadelphia in 1753-'54, by a schooner of about sixty tons, fitted out by subscription by merchants of Maryland, Pennsylvania, New York and Boston to discover the Northwest passage.

Although Capt. Hall on his first voyage was unable to reach King William's Land or obtain any definite information regarding the records of the Franklin Expedition, he returned home inured by the hardships of life amongst the Esquimaux, and well prepared by this experience for the much greater trial of his courage and perseverance which awaited him. After nearly two years spent in efforts to obtain funds and supplies, he again sailed on July 1, 1864, in the whaling brig *Monticello* for Hudson's bay, taking with him the Esquimaux, Joe Ebierbing, and his wife, Too-koo-li-too. After stopping at Depot island, he finally landed at a point on the shore of Roe's Welcome, near Wager bay, on the 31st of August. He was obliged to remain in this neighborhood with a tribe of Innuits all winter, living in an igloo or snow hut.

"The construction of one of these snow houses, built by the Innuits of this region, is described by him substantially as follows: After making trial of several banks of snow, by plunging in their long knives, on finding the proper compactness, they cut blocks two to two and a-half feet in length and about eighteen inches in thickness. One set is cut from the spot on which the *igloo* is to be built, its floor being thus sunken eighteen inches below the general surface. In placing the blocks around this excavation, of about ten feet diameter, the first tier is made up of those which, by increasing regularly in width, form a spiral from right to left. They are laid from within, each being secured by a bevel on the one last laid and another bevel on the next one below. The joints are well broken. The blocks incline inwardly, thus regularly diminishing the diameter of the *igloo* and fitting it for the dome or keystone. Thirty-eight blocks were here used. For ventilation, a small hole is usually made by the spear. The crevices are well filled with snow within and without, making it nearly an air-tight structure. For a window, a small opening cut in the dome is filled in usually with a block of clear ice; in some cases with the scraped inner linings of the seal; this last makes a light on which the frost does not settle as upon the ice-blocks. The passage-way to the *igloo* is always long and points toward the south. The Repulse bay natives shovel up much more snow upon the hut than the Greenlanders do. The *igloo* lamp is sometimes nothing more than a flat stone, about six inches in length, placed in a niche cut out of the wall, and having on it a little dry moss for a wick, which is supplied with oil by a slice of blubber from

the bear or the seal. A stone lamp of better form, although poor enough, will give something of a fair light and warmth."



Hall's first Igloo and Ground Plan.

During the next summer he succeeded in reaching Repulse bay, where the winter of 1865-66 was passed, and it was not until April, 1866, that he was able to start for King William's Land with a small party of natives, three sledges and eighteen dogs. On leaving Fort Hope, at the head of Repulse bay, he followed, as nearly as practicable, Dr. Rae's route in 1854, to Colville bay. From here, however, he was obliged, most reluctantly, to return to Fort Hope, owing to the hostility of the tribes occupying the region around Pelly bay and the timidity of his own people. He was, however, able to obtain much interesting information concerning the Franklin expedition.

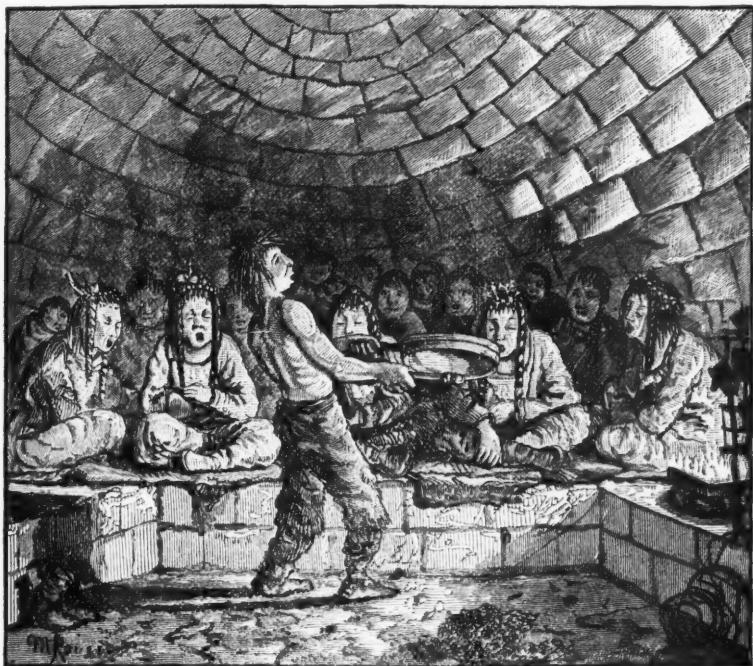
"Disappointed but not dismayed" is his entry in his journal on his turning back from Colville bay, although he knew another winter must elapse before he could hope to reach the goal of his journey—the island which witnessed the destruction of the memorable expedition. The remainder of this year was passed in the neighborhood of Repulse bay, the loneliness of his life being much relieved by the arrival and detention over the winter of four whaling ships.

Interesting accounts are given of the superstitious customs and amusements of the Esquimaux. One of the latter is the performance on the *key-low-tik*, their bass drum, the only musical instrument Hall found among them. "The drum is made from the skin of the deer, which is stretched over a hoop made of wood, or of bone from the fin of a whale, by the use of a strong braided cord of sinew passed around a groove on the outside. The instrument weighs about four pounds." The wooden drum stick is called a *ken-toon*.

"When the *key-low-tik* is played, the drum-handle is held in the left hand of the performer, who strikes the edge of the rim opposite that over which the skin is stretched. He holds the drum in different positions, but keeps it in a constant fan-like motion by his hand and by the blows of the *ken-toon* struck alternately on the opposite sides of the edge. Skillfully keeping the drum vibrating on the handle, he accompanies this with grotesque motions of the body, and at intervals with a song, while the women keep up their own Inuit songs, one after another, through the whole performance.

"At the first exhibition which Hall witnessed some twenty-five men, women and children—every one who could leave home— assembled to see the skill of the performers, who would try the newly-finished instrument. As usual, the women sat on the plat-

form, Turk fashion; the men behind them with extended legs. The women were gaily dressed. They wore on each side of the face an enormous pig-tail, made by wrapping their hair on a small wooden roller a foot in length; strips of reindeer fur being wrapped with the hair. These were black and white for those who had sons, and black only for those who had none. Shining ornaments were worn on the head, and on the breast they had masonic-like aprons, the groundwork of which was of a flaming red color, ornamented with glass beads of many colors. The



Playing the Key-low-tik.

women thus presented a pleasing contrast with the dark visages of the men in the background; while their naked infants were playing here and there in a mother's lap, or peering out from their nestling place in a hood."

February and March, 1867, were spent in a journey of more than one hundred miles to Ig-loo-lik to procure dogs. He was successful in this but suffered much from cold and hunger, and on his return to Repulse bay was again, to his bitter disappointment, obliged to relinquish his expedition to King William's Land.

The captains of the whaling fleet, notwithstanding their previous promises, now refused to spare him any of their men for this journey.

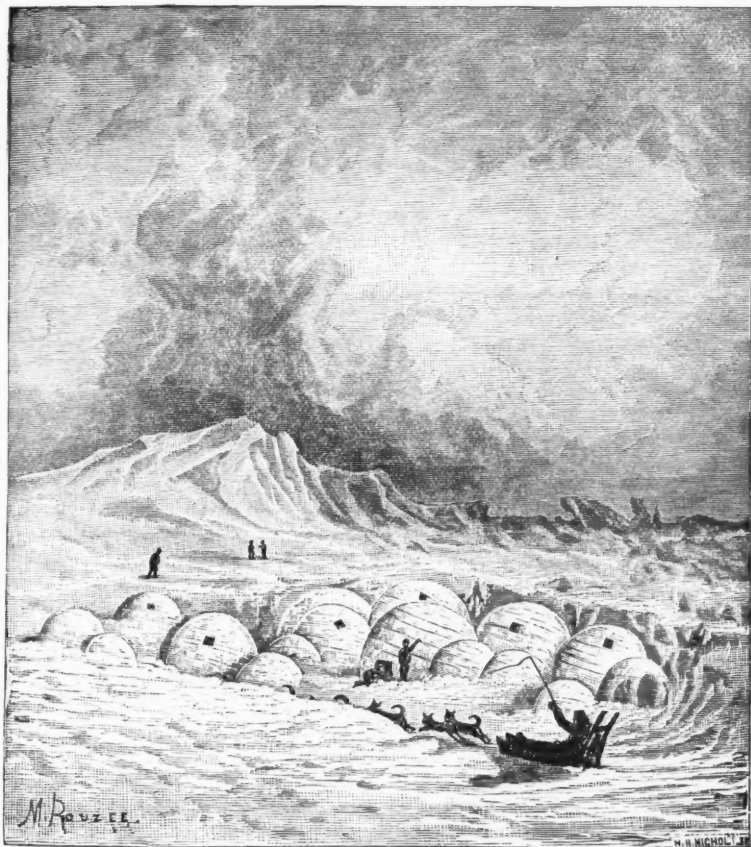
His courage and perseverance were, however, equal to the situation, and he resolutely declined to return home in the autumn. A fourth winter found him still in his igloo at his old quarters. But his attention was now suddenly diverted from King William's Land to the northern extremity of Melville peninsula on the shore of Fury and Hecla strait where he now heard of the existence of a monument, and was told that two white men had been seen there only three years before. Accordingly on March 23, 1868, he started for this region. The monument was discovered on the 24th of April in lat.  $69^{\circ} 47' 5''$  N., long.  $85^{\circ} 15'$  W., near Cape Crozier. "On either side of the plain on which it stands is a river, and hills of delta are north-east of it. It is one hundred feet above the sea, and near a hill upon the south side of the plain." "The spot visited had not been reached by any previous Arctic explorer. Parry's officers were not on this western side of the peninsula, and Dr. Rae's highest point was  $69^{\circ} 5' 35''$  N. (Rae's Narrative, p. 128)." "Dr. Rae could not possibly have made this monument and cache, for they both belong together; the latter covered with a deep drift every winter, and when Rae was at Cape Crozier in May 1846, the bank of snow must have been as deep and hard as the one now there. Besides, Dr. Rae's track-chart does not show that he visited the south-east angle of Parry bay."

The spot, near by where the Innuits stated a cache had been made and afterwards removed, leaving the stones in a pile on one side, was covered by a huge bank of snow, and after digging to the depth of fifteen feet they were unable to find the stones. Two tenting places also were found, one of which being very different in character from the other made by Esquimaux, was in all probability the work of white men. Hall took down the monument, stone by stone, but found nothing to indicate who were its builders.

The heretofore unsurveyed coast line between Capes Englefield and Crozier was now accurately laid down. An island was discovered north-west of Cape Englefield, and the islands off the cape and the line of the southern coast as far as East cape searched thoroughly for monuments or the evidences of the presence of

civilized men. After a sledge journey of ninety-six days he returned to Repulse bay on June 26.

The winter of 1868-9 was spent in resting and preparing for his last and successful attempt to reach King William's Land. He set out once more, on March 23, 1869, for this remote island with



Snow Village.

a party of natives consisting of five men, three women and two children, with two sledges and eighteen dogs, and followed the route previously taken in 1866 to Colville bay. Thence crossing Pelly bay he visited an encampment of natives of that region finding there some relics of the Franklin expedition.



Continuing on to the coast near Point Acland, opposite King William's Land, he found another native settlement where a large number of articles from the *Erebus* and *Terror* were seen. Leaving most of his party here he started on May 8, with one of the tribe as a guide, on a flying visit to King William's Land, his people insisting on returning to Repulse bay within two weeks. On the 11th, Hall encamped on one of the Todd islands off the south-eastern extremity of King William's Land. Searching here for human remains no satisfactory result was obtained, but the next day, crossing to the mainland near the mouth of the Peffer river, and digging through the snow, one unburied skeleton was found. "The gale above and the hardness and depth of snow under foot debarred further search." He also searched with no success at another point on the southern coast, further eastward. He was then obliged to return to his party, and after some interesting conversations with the natives set out on his return journey, having thus been only able to touch at two points on the coast of King William's Land and at Todd island, and that too at a season when the snow still covered the land.

On the return journey he was seized with a sudden and serious illness, a premonition, no doubt, of the sudden and final attack in 1871. He reached his old quarters restored to health on June 20th, his arrival being delayed by the large quantities of game found and the frequent musk-ox hunts. When a band of musk cattle was discovered and surrounded, "as soon as they perceived that the dogs were slipped, they formed into their usual one circle of defense, 'a musk-bull battery of nine solid battering heads and twice the number of sharpened horns.' The dogs were quickly at these heads, barking and jumping back and forward, while the hunters made no haste to advance, for they knew that the bulls would stand their ground all day if no other enemies came.

"'After a few minutes' watch of the movements of dog versus bull and bull versus dog,' the old hunter, *In-nook-poo-shee-jook*, went forward to within twelve feet of a large bull, carrying a lance which had a line attached by which he could draw it back; but at his second throw the wounded and infuriated bull made a fearful forward plunge, from the effects of which the hunter and his companions escaped only by a very timely jump to the left. The bull was soon again brought to bay. *On-c-la* then pulled trigger on another noble bull of the circle of defense, and *Pa-pa*



shot the one which had been lanced, when at the noise of these guns the whole circle bolted away except two, who stood their ground side by side long after the whole fight was ended, and even when the dogs were driven away from them and stones had been thrown. Instead of moving, each of these two kept throwing his massive head down between his fore feet, rubbing the tip of each horn against the fore leg as one would rub a razor on a strop. This is the animal's habit unless he finds himself, when attacked, near some large stone which he may use for the same purpose of sharpening his horns."

On August 5th the whaler, *Ansell Gibbs*, arrived in the bay, and his five years of Arctic life came to a close. On September 26, 1869, he, with Esquimaux Joe, Hannah and her adopted child, were safely landed at New Bedford, Mass.

Having thus briefly indicated the most important events in this remarkable journey, we must note the at least partial success attained in the execution of the purpose for which it was undertaken.

While no records of the Franklin expedition were recovered, there were many new facts ascertained regarding the last days of the members of that wretched company who perished one by one, after the abandonment of the *Erebus* and *Terror*. As is well known these vessels were deserted by their officers and crews, then consisting of 105 souls, on the 22d of April, 1848, off Point Victory near the north-western extremity of King William's Land. Capt. Hall in writing to Mr. Henry Grinnell, states:

"None of Sir John Franklin's companions ever reached or died on Montreal Island. It was late in July, 1848, that Crozier and his party of about forty or forty-five passed down the west coast of King William's Land in the vicinity of Cape Herschel. The party was dragging two sledges on the sea-ice, which was nearly in its last stage of dissolution: one a large sledge laden with an awning-covered boat, and the other a small one laden with provisions and camp material. Just before Crozier and party arrived at Cape Herschel, they were met by four families of natives, and both parties went into camp near each other. Two Eskimo men, who were of the native party, gave me much sad but deeply interesting information. Some of it stirred my heart with sadness, intermingled with rage, for it was a confession that they, with their companions, did secretly and hastily abandon Crozier and his party to suffer and die for need of fresh provisions, when in truth it was in the power of the natives to save every man alive.

"The next trace of Crozier and his party is to be found in the skeleton which McClintock discovered a little below, to the south-

ward and eastward of Cape Herschel; this was never found by the natives. The next trace is a camping-place on the sea-shore of King William's Land, about three miles eastward of Pfeffer river, where two men died and received Christian (?) burial. At this place fish-bones were found by the natives, which showed them that Crozier and his party had caught while there a species of fish excellent for food, with which the sea there abounds. The next trace of this party occurs about five or six miles eastward, on a long, low point of King William's Land, where one man died and was buried. Then, about south-south-east, two and a half-miles further, the next trace occurs on Todd's islet, where the remains of five men lie. The next certain trace of this party is on the west side of the islet, west of Point Richardson, on some low land that is an island or part of the main land, as the tide may be. Here the awning-covered boat and the remains of about thirty or thirty-five of Crozier's party were found by the native *Poo-yet-ta*, of whom Sir John Ross has given a description in the account of his voyage in the *Victory* in 1829-'34.

"In the spring of 1849, a large tent was found by the natives whom I saw, the floor of which was completely covered with the remains of white men. Close by were two graves. This tent was a little way inland from the head of Terror bay. In the spring of 1861, when the snow was nearly all gone, an Eskimo party, conducted by a native well known throughout the northern regions, found two boats, with many skeletons in and about them. One of these boats had been previously found by McClintock; the other was found lying from a quarter to a half mile distant, and must have been completely entombed in snow at the time McClintock's parties were there, or they most assuredly would have seen it. In and about this boat, beside the skeletons alluded to, were found many relics, most of them similar in character to those McClintock has enumerated as having been found in the boat he discovered.

"I tried hard to accomplish far more than I did, but not one of the company would on any account whatever consent to remain with me in that country and make a summer search over that island, which, from information I had gained from the natives, I had reason to suppose would be rewarded by the discovery of the whole of the manuscript records that had been accumulated in that great expedition, and had been deposited in a vault a little way inland or eastward of Cape Victory. Knowing as I now do the character of the Eskimos in that part of the country in which King William's Land is situated, I cannot wonder at nor blame the Repulse bay natives for their refusal to remain there, as I desired. It is quite probable that, had we remained there as I wished, no one of us would ever have got out of the country alive. How could we expect, if we got into straitened circumstances, that we would receive better treatment from the Eskimos

of that country than the 105 souls who were under the command of the heroic Crozier some time after landing on King William's Land? Could I and my party with reasonable safety have remained to make a summer search on King William's Land, it is not only probable that we should have recovered the logs and journals of Sir John Franklin's Expedition, but have gathered up and entombed the remains of nearly 100 of his companions; for they lie about the places where the three boats have been found and at the large camping-place at the head of Terror bay and the three other places that I have already mentioned. In the cove, west side of Point Richardson, however, nature herself has opened her bosom and given sepulture to the bones of the immortal heroes who died there. Wherever the Eskimos have found the graves of Franklin's companions, they have dug them open and robbed the dead, leaving them exposed to the ravages of wild beasts.

"I could have readily gathered great quantities—a very great variety—of RELICS of Sir John Franklin's Expedition, for they are now possessed by natives all over the Arctic regions that I visited or heard of—from Pond's bay to Mackenzie river. As it was, I had to be satisfied with taking upon our sledges about 125 pounds total weight of relics from natives about King William's Land. Some of these I will enumerate:

"1. A portion of one side (several planks and ribs fast together) of a boat, clinker-built and copper-fastened. This part of a boat is of the one found near the boat found by McClintock's party. 2. A small oak sledge-runner, reduced from the sledge on which the boat rested. 3. Part of the mast of the Northwest Passage ship. 4. Chronometer-box, with its number, name of the maker, and the Queen's broad arrow engraved upon it. 5. Two long heavy sheets of copper, three and four inches wide, with counter-sunk holes for screw-nails. On these sheets, as well as on most everything else that came from the Northwest Passage ship, are numerous stamps of the Queen's broad arrow. 6. Mahogany writing-desk, elaborately finished and bound in brass. 7. Many pièces of silver-plate, forks, and spoons, bearing crests and initials of the owners. 8. Parts of watches. 9. Knives and very many other things which you, Mr. Grinnell, and others interested in the fate of the Franklin Expedition will take a sad interest in inspecting on their arrival in the States. One entire skeleton I have brought to the United States.<sup>1</sup>

"The same year that the *Erebus* and *Terror* were abandoned one of them consummated the Great Northwest Passage, having five

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ward and eastward of Cape Herschel; this was never found by the natives. The next trace is a camping-place on the sea-shore of King William's Land, about three miles eastward of Pfeffer river, where two men died and received Christian (?) burial. At this place fish-bones were found by the natives, which showed them that Crozier and his party had caught while there a species of fish excellent for food, with which the sea there abounds. The next trace of this party occurs about five or six miles eastward, on a long, low point of King William's Land, where one man died and was buried. Then, about south-south-east, two and a half-miles further, the next trace occurs on Todd's islet, where the remains of five men lie. The next certain trace of this party is on the west side of the islet, west of Point Richardson, on some low land that is an island or part of the main land, as the tide may be. Here the awning-covered boat and the remains of about thirty or thirty-five of Crozier's party were found by the native *Poo-yet-ta*, of whom Sir John Ross has given a description in the account of his voyage in the *Victory* in 1829-'34.

"In the spring of 1849, a large tent was found by the natives whom I saw, the floor of which was completely covered with the remains of white men. Close by were two graves. This tent was a little way inland from the head of Terror bay. In the spring of 1861, when the snow was nearly all gone, an Eskimo party, conducted by a native well known throughout the northern regions, found two boats, with many skeletons in and about them. One of these boats had been previously found by McClintock; the other was found lying from a quarter to a half mile distant, and must have been completely entombed in snow at the time McClintock's parties were there, or they most assuredly would have seen it. In and about this boat, beside the skeletons alluded to, were found many relics, most of them similar in character to those McClintock has enumerated as having been found in the boat he discovered.

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*men aboard.* The evidence of the exact number is circumstantial. Everything about this Northwest Passage ship was in complete order. It was found by the Ook-joo-lik natives near O'Reilly Island, lat.  $68^{\circ} 30' N.$ , long.  $99^{\circ} W.$ , early in the spring of 1849, frozen in the midst of a floe of only one winter's formation."

This vessel was sunk by the Innuits in getting wood out. The other vessel is reported by the Esquimaux to have been crushed by heavy ice in the spring of 1848, while the crew were engaged in getting out provisions. Capt. Crozier and another man, perhaps Surgeon Macdonald, appears to have survived their comrades and are reported to have been heard of by the natives near Chesterfield Inlet. There are some indications that a portion at least of the party after trying to go down the west side of King William's Land had turned back, doubled Cape Felix, and had passed down the eastern coast. Between Port Parry and Cape Sabine on that coast See-pung-er, an Innuir, reports finding a monument within which he found a tin cup containing manuscript which was thrown away as useless. "He said further that he and his uncle had spent one night near this monument, wrapping themselves up in blankets taken from a pile of white men's clothing found there, and that a kob-lu-na's (white man's) skeleton lay by the pile." "Hall appears to have been impressed with the great probability that all of Franklin's party had not continued on the hopeless route to Back's river." Prof. Nourse quotes Dr. Rae in confirmation of this opinion. This well-known Arctic explorer suggests that Fury beach where an immense stock of provisions still remained at the place where the *Fury* was wrecked was much more accessible than any of the Hudson's Bay Company's settlements.

But it seems very questionable whether the result would have been any the less disastrous had this course been adopted, feasible as it appears, for the rapidity with which the greater portion of the party succumbed to the hardships of the journey indicates great feebleness of health or great scarcity of food. That the latter was indeed the case we have every reason to believe, yet, why it should have been, with one vessel still afloat and afterwards found by the natives in complete order, and well supplied with all kinds of food (see page 404) is one of the many unsolved enigmas connected with the fate of the Franklin expedition. Capt. Hall thought he could account for as many as seventy-nine of the party, but for this belief he has to rely upon the very vague statement of the Innuits.





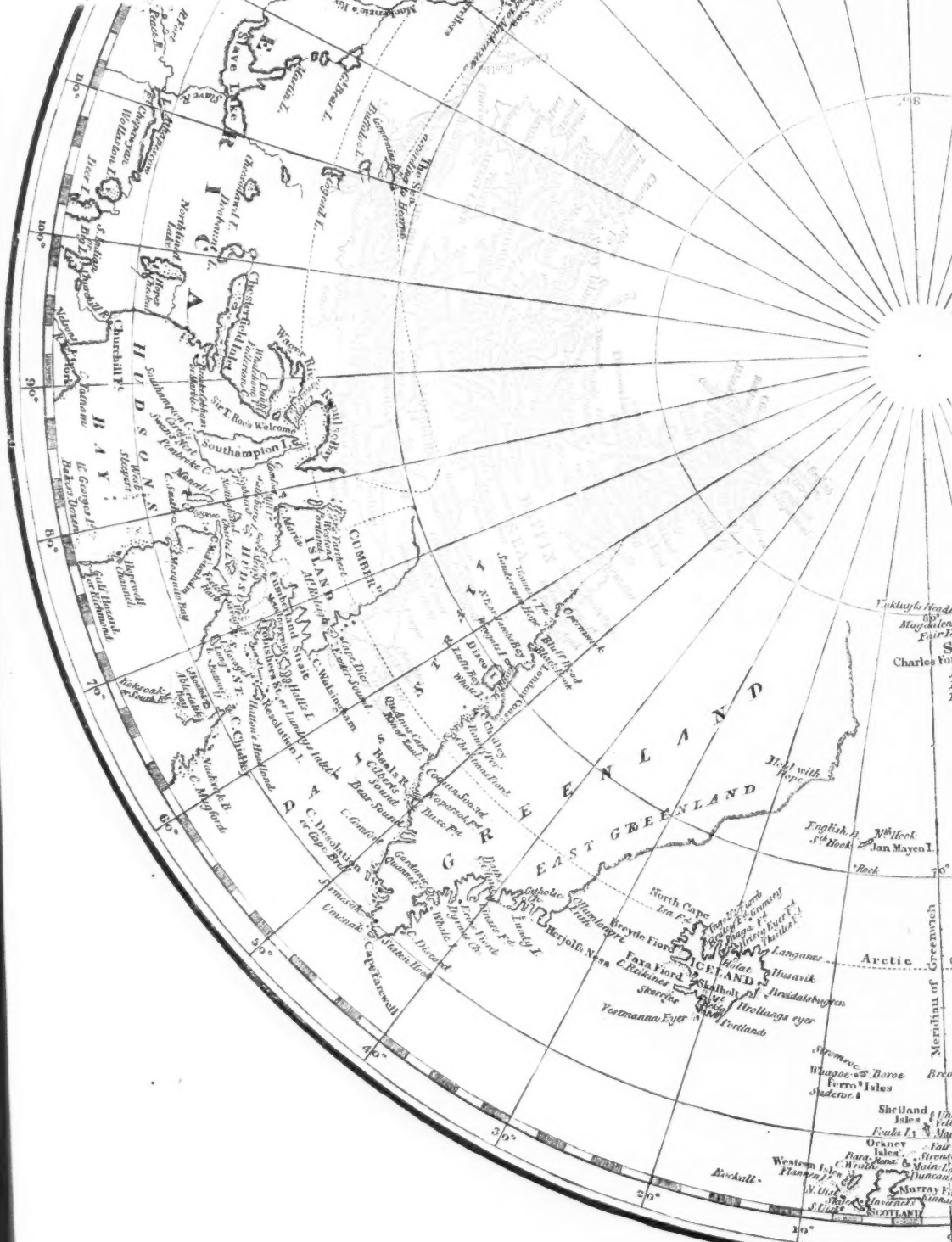
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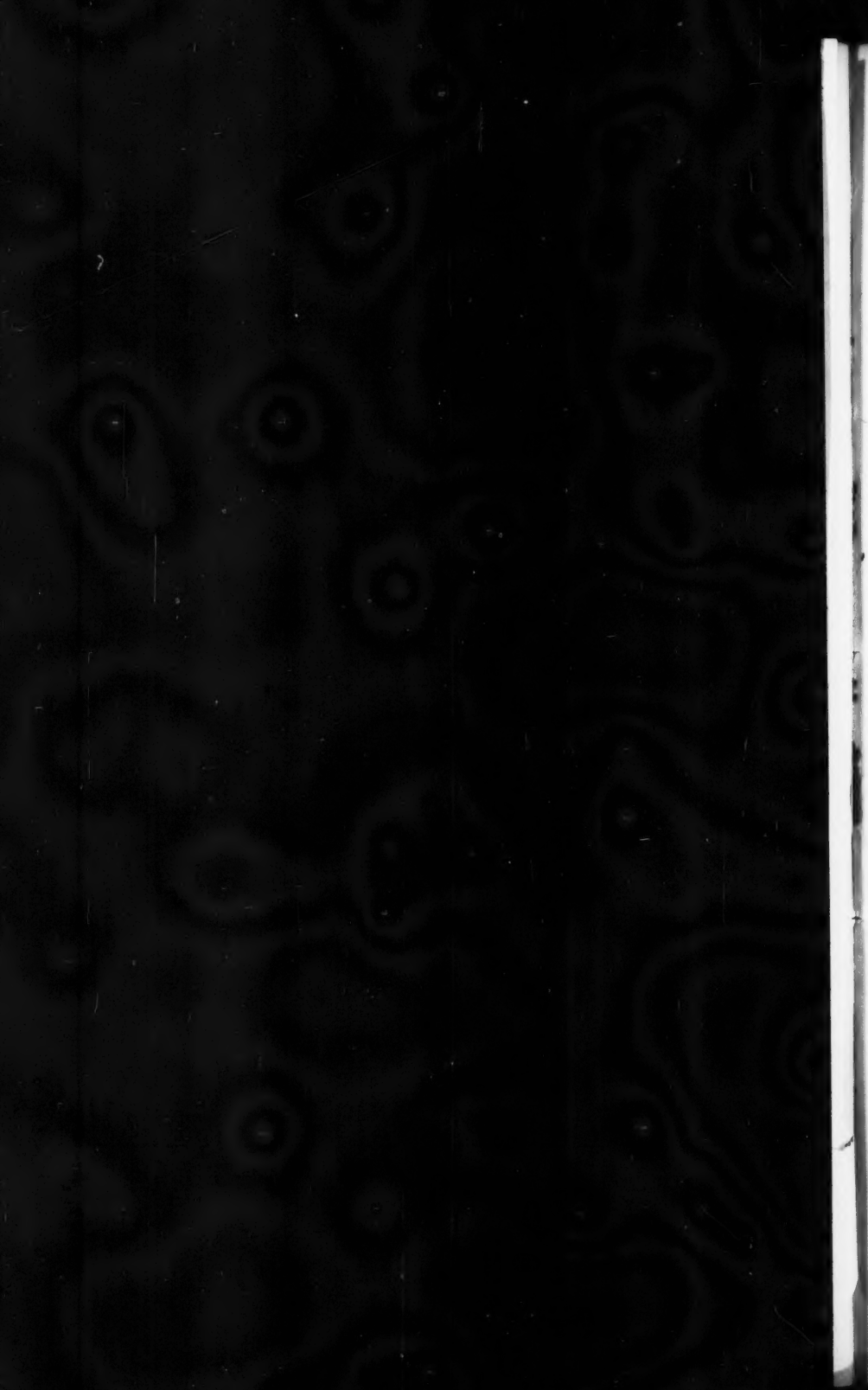




Circumpolar Map No. II (Geographical)



John Murray, Albemarle Street, w<sup>th</sup> Oct. 1818.  
 al Discoveries made since 1818 in Red).



That a large number of books and manuscripts still remain buried in the snow on King William's Land and also records more carefully deposited may exist is at least highly probable, and it is very much to be hoped that the expedition now out under Lieut. Schwatka<sup>1</sup> has been able, as he hoped, to explore this island during the past summer. The monument and cache near Cape Crozier, however interesting and remarkable, are certainly of much less importance, and we are glad to learn that the time will not be lost in visiting them as first proposed. Although the accounts of the presence of white men in the north-western portion of the Melville peninsula are not to be overlooked, corroborated as they are by the existence of this monument and tenting place, it seems hardly possible that any members of the lost expedition should have gone in this direction; so far out of the way of help and necessitating the crossing of the Boothia gulf—more especially when the existence of the supplies at Fury beach must have been known by them.

Although geographical inquiry was not the first object of Hall's journey, he made many interesting discoveries which are clearly shown on his maps, several of which accompanying the text are of much interest and value. There are also eight sketches of coast lines drawn by the Innuits. The preliminary chapter is illustrated by circumpolar and other maps showing the progress of discovery since 1818, Franklin's track, etc.<sup>2</sup> A large circumpolar pocket map with explorers names and very satisfactorily mounted in sections is also given. It is brought down to the present time, showing the results of Nordenskiöld's discoveries and corrections of the Asiatic coast. The wood engravings are numerous and many of great interest. The appendix contains Hall's Astronomical and Meteorological observations, his conversations with the Innuits, and also a valuable paper by B. K. Emerson, Professor of Geology, at Amherst College, on the Geology of Frobisher bay and Field bay, as illustrated by the collections made by Capt. Hall in 1860-2 and now in the College Museum. Prof. Emerson states that "the common crystalline rocks of the Arctic regions, granitic and gneissose, made up the bulk of the collection." "With these were traps, red massive quartzites, sandstones, gray

<sup>1</sup> See *NATURALIST*, August, 1878, p. 571, and November, 1879, p. 723.

<sup>2</sup> A copy of the circumpolar map showing the progress of discovery is given herewith, for which and also for the accompanying illustrations we are indebted to the kindness of Prof. J. E. Nourse.

and cream-colored dolomites and limestones, and a few pieces of black cherty and dark fissile limestones, which furnished so many fossils new in these regions, and coming from a horizon which had not before been known to be represented so far north—that of the Utica slate.” \* \* \* “The geological collections made by



Aurora sketched by Hall.

him [Hall] give us the only information concerning the occurrence of the Lower Silurian in the whole of Arctic America, north of Rupert's Land, with the single exception of the fossils collected by Capt. McClintock and described by Houghton.” These latter were brought from North Devon, Bellots straits and



King William's Land and a comparison with the fossils from Frobisher's bay, shows that that locality bears "somewhat the same relation to those of King William's Land and North Devon, which the typical localities of the Utica slate and the Hudson River group in New York bear to the more western areas of the Mississippi Basin." "In Frobisher bay we have a group of fossils unmixed with those of earlier or later date, which mark the exact horizon of the Utica slate, and the rocks have a lithological facies recalling that of the typical localities of this epoch in New York." "In the north-western area the whole Paleozoic series seem to be represented by a nearly unbroken succession of limestones, and the subdivisions merge into each other as in the central basin of the United States." "So that Houghton says, 'the whole of North Somerset, Boothia Felix, King William's Land and Prince of Wales Land is thus proved to be of Silurian age, although the evidence as to whether it is Upper or Lower Silurian is contradictory, as characteristic fossils of both epochs are found throughout the whole area.'" And the fossils from the Bay of Frobisher show that this great Arctic limestone area extends greatly to the south-east, and make it comparable in size with the central basin of the United States.

An interesting "note" by Hall on the finding of stones, rocks, and sands on the floe ice is given. He believes that these are caught up by the ice from the bottom of shallow waters and not deposited upon its surface.

"As the spring-tides come on, during their ebb, in many shallow parts of Hudson's bay, sheets of ice rest upon rocks, stones, shells, and weeds. These sheets of ice as they lie, send down showers upon the already moist bottom, all of which congelate at once into a solid mass by the piercing, pinching cold of the north. Rocks and stones, shells and weed, sheets of ice, and what was trickling water become *one* solid body. The tide now floods and lifts the floe, having on its nether surface a ponderous load of earthy matter. Before another ebb, King Cold has succeeded in adding several inches of ice underneath the structure of rocks, stones, land, shells, and weeds, which are now completely enveloped in crystal. Ebb and flood succeed each other, and as often add a stone or other foreign matter, and then another stratum of ice to the floe or smaller pieces of ice that during certain intervals are afloat or aground."

A paper on "Whale and Seal Oil in the manufacture of Jute," concludes a work which is a very valuable addition to the numerous narratives of Arctic discovery. *Ellis Hornor Yarnall.*

SKETCH OF NORTH AMERICAN ANTHROPOLOGY  
IN 1879.

BY OTIS T. MASON.

**A**NTHROPOLOGY is that science which has for its object-matter the human race, and has reference: 1. To the origin of man considered zoologically, geologically, geographically and chronologically, and to his pristine mental and social condition; 2. To humanity as a whole compared with other similar groups of the animal kingdom, and with itself in different environments, and in various stages of culture; 3. To the natural division of the species into races or varieties.

This science is related, more or less intimately, with every other department of human knowledge; so much so that he who would know a great deal about this one subject, must needs know a little about everything.

Between anthropology and many ancillary sciences it is not very difficult to draw the line, if we keep in view the fact that it is always comparative, or gathering materials for comparison. The physician studies the structure and functions of the human body, not to compare but to heal. The historian regards the actions of men, so does the anthropologist; but the former pays most attention to the conduct of individuals, or the voluntary and incidental conduct of masses; while the latter scrutinizes those actions that are tribal, inherited; not so much what a people did, as what they did habitually; not so much what they are doing, as what they are accustomed to do.

As the bounds of knowledge widen and the relations existing between the soul of man and his material environment become better understood, many of those phenomena which are looked upon by the historian and the biologist as erratic, will be found working in obedience to physical and spiritual laws.

With this preliminary thought in our minds to guide and restrain us, let us take a glance at the field of anthropological research in our own continent during the year 1879. It will be necessary to include in this review works on American anthropology by foreigners as well as by our own scholars, and also those by American writers upon the subject in general, as well as upon topics outside of North America.<sup>1</sup>

<sup>1</sup> The writer must be pardoned if he does not sufficiently appreciate the merits of many worthy publications, and if he passes others by entirely. No work that has



*Anthropogeny.*—As before indicated, the origin of man combines many subsidiary questions. Is he, or is he not, derived by descent from some ancestral species whose very remains as yet are hiding from us in tertiary strata? In what geological epoch must we search for his earliest occurrence? or, to what horizon do the earliest traces of him already discovered belong? At what precise spot on the earth did our race originate, granting that there was but one such locality? If there were more than one, the problem becomes the more complex indeed, but that does not relieve us of the responsibility of attempting its solution. How many centuries, or millenniums, or eons ago was this most interesting event? What was the bodily form and proportion, and what was the mental and moral status of that pristine individual or brood? The answers to all these questions may be divided into three classes, the brachychronic, the dolicochronic, and the agnostic, as the works bearing the following titles will show:

- DELANEY, MARTIN R.—The origin of race and color. Harper & Bros.  
 COOK, JOSEPH.—Heredity, with preludes on current events. Houghton & Osgood, Boston.  
 DE QUATREFAGES, A.—The human species. Translated from the French and forming No. 27 of the International Scientific series. D. Appleton & Co.  
 FISKE, JOHN.—Darwinism and other essays. Macmillan.  
 HAECKEL, PROF. ERNST.—The evolution of Man. A popular exposition of the principal points of human ontogeny and phylogeny. Translated from the German. D. Appleton & Co. (By far the most learned treatise on anthropogeny published during the year. A summary of its contents, prepared by Lester F. Ward, of Washington, gives in small space a résumé of the work.)  
 KINSLEY, W. W.—When did the human race begin? *Penn Month.*, Sept., Oct.  
 MACLEAN, J. P.—Manual of the Antiquity of Man. Robert Clarke & Co., Cin.  
 MUDGE, B. F.—Another view of the antiquity of man. *Kansas Cy. Rev.*, Aug.  
 WARD, LESTER F.—Haeckel's genesis of man. E. Stern & Co., Philad.  
 WILSON, DANIEL.—Some American illustrations of the evolution of new varieties of man. *J. Anthropol. Inst.*, May.  
 The ethnical influence of physical geography. Am. Assoc. at Saratoga.

*Archæology.*—The province of archæology joins hard upon that of anthropogeny, if it does not overlap it in places. The latter, however, is concerned with the pristine or original facts of humanity, while the former regards the priscean condition of the various human groups. However long ago man is claimed to have been received by him is slighted. It may be well to remark that the Annual Record, hitherto published by the Harpers, will be continued in Prof. Baird's Smithsonian Annual Report, and authors desiring to be entered in the list of contributors to anthropological science must send a copy of their productions to me direct.

have lived in North America, none of the relics thus far discovered are supposed to belong to the origin of the race. It is a fact, however, that a far greater antiquity is demanded for our race than was supposed to belong to it a few years ago. The following contributions were all made during 1879:

- ABBOTT, C. C.—Pliocene man. *Kansas Cy. Rev.*, Nov.
- BARBER, E. A.—Antiquity of the tobacco pipe in Europe. *Am. Antiquarian*, II, No. 1.
- Examination of Indian graves in Chester county, Penna. *Am. Naturalist*, May.
- Native American architecture. *Am. Antiquarian*, II, No. 1.
- BINKLEY, S. H.—Prehistoric manufacturing village in the Miami valley. *Am. Antiquarian*, I, 4.
- BROADHEAD, G. C.—The walled lakes of Iowa. *Kansas Cy. Rev.*, Feb.
- CLARKE, H. B.—Shell beds of Clatsop beach. *Am. Antiquarian*, I, No. 4.
- Colorado, Ancient remains in. *Builder*, July 26.
- CONANT, A. J.—Footprints of vanished races. C. R. Barns, St. Louis.
- DE HART, J. N.—The emblematic mounds of Wisconsin. *Am. Antiquarian*, I, No. 4.
- ELLIOTT, E. T.—The age of cave-dwellers in America. *Pop. Sc. Month.*, Aug.
- FARQUHARSON, R. J.—The Rockford and Davenport tablets. *Am. Antiquarian*, Jan.
- FORCE, M. F.—Some early notices of the Indians of Ohio. R. Clarke & Co., Cin.
- FREY, L. S.—Were they Mound-builders? *Am. Naturalist*, Oct.
- HALDEMAN, S. S.—On unsymmetrical arrow-heads and allied forms. *Am. Naturalist*, May.
- HARTT, CH. FRED.—Notes on the manufactory of pottery among savage races. *Am. Naturalist*, Feb.
- HOFFMAN, W. J.—Turtle-back celts in the District of Columbia. *Am. Naturalist*, Feb.
- HOLMES, WM. H.—Notes on an extensive deposit of obsidian in the Yellowstone National Park. *Am. Naturalist*, April.
- Report on the ancient ruins of Southwestern Colorado examined during the summers of 1875 and 1876. *Hayden's Annual Report for 1876*. (This valuable paper did not appear until 1879.)
- JACKSON, REV. S.—The ancient cities of Cibola. *Rocky Mt. News*, Jan.
- JEWITT, L.—Pottery in prehistoric times. *Ill. Art Journal*, Nov.
- Kansas, Prehistoric mounds in. *Kansas Cy. Rev.*, Jan.
- LOW, C. A.—Appendix to Short's North Americans of Antiquity.
- LYKINS, W. H. R.—Stone-age in Kansas. *Kansas Cy. Rev.*, Oct.
- MACLEAN, J. P.—The Mound-builders. R. Clarke & Co., Cin.
- MASON, G. C.—The old stone mill at Newport. *Mag. Am. Hist.*, Sept.
- Mastodon, The home of the. *Kansas Cy. Rev.*, Sept.
- MORSE, E. S.—Traces of early man in Japan. D. Appleton. (We mention this work not only because the author is an American, but because the remains which he has discovered are so wonderfully similar to those of the same class in our own country.)

- PEET, S. D.—A comparison between the archæology of Europe and America. *Am. Antiquarian*, I, No. 4.  
The sources of information as to the prehistoric condition of America. *Am. Antiquarian*, II, No. 1.
- PERKINS, GEO. H.—Archæology of the Champlain valley. *Am. Naturalist*, Dec.
- PUTNAM, F. W.—Archæological explorations in Tennessee. *Kansas Cy. Rev.*, May-Aug.  
On some large and remarkable stone implements of the Southern Mound-builders. *Am. Assoc. at Saratoga*.  
On the pottery of the Southern Mound-builders. *Am. Assoc. at Saratoga*.
- RAU, CHARLES — The Palenque tablet in the United States National Museum. *Smithson. Cont. to Knowledge*, 331.  
The Dighton rock inscription. *Mag. Am. Hist.*, April.
- READ, M. C.—The inscribed stone of Grave Creek mound. *Am. Antiquarian*, II, No. 1.  
Stone tubes, used in smoking tobacco. *Am. Antiquarian*, II, No. 1.
- REDDING, B. B.—How our ancestors in the stone-age made their implements. *Am. Naturalist*, Nov.
- REYNOLDS, ELMER R.—Aboriginal soapstone quarries in the District of Columbia. *Rep. Peabody Museum*, XII. Abstract.
- SHIPP, B.—Ancient artificial mounds. *Louisville Mag.*, Jan.
- SHORT, JOHN T.—The North Americans of Antiquity. Harper & Bros.
- SKERTCHLY, S. B. J.—Cliff-dwellers in the far west. *Century*, July 26.
- SLAFTER, REV. E. F.—Prehistoric copper implements. *N. E. Hist. and Gen. Register*, Jan.
- SOUTHALL, J. C.—The lapse of time since the Glacial epoch. *J. Vic. Inst.* Brochure.
- TEMPLIN, L. J.—Antiquity of man. *Kansas City Rev.*, June.
- VOGELES, A. W.—Notes on a lost race of America. *Am. Naturalist*, Jan.
- WADDELL, J. A.—The failures and fallacies of prehistoric archæology. *So. Presbyterian Rev.*, Oct.
- WOOLLEY, CHAS. F.—Sand-fields and shell-heaps. *Am. Antiquarian*, I. 4.

In closing this section, the writer would enter a mild and friendly protest against the careless and ruthless manner in which our antiquities are being destroyed. Upon those wealthy gentlemen whose tastes have led them to make aboriginal relics a matter of merchandise must certainly rest the responsibility of having them procured by the most competent hands, and all the circumstances and surroundings of the find accurately recorded.

*Somatology.*—Whatever may be our opinion respecting the materiality of the mind, no one denies that man resembles all other living creatures in the method of his generation, in embryonic development, in the periods of growth, maturity, and decay, in amenability to his material environment, in disease and heredity, and, briefly, in all those structural and functional characteristics which go to make up his animal nature. It is also true

that groups of men possess anatomical and physiological peculiarities which distinguish them as races or varieties, which seem to link them with animal groups not far below them, and which indicate an increase in refinement of organism coincident with the progress of civilization. A better knowledge of somatic characteristics has also enabled the anthropologists to call upon the witness stand other portions of the organism than the cranium. That American works in this field fall far behind those of Europe upon the same subject, any one may convince himself who will compare the following list with a fuller one in Baird's forthcoming Annual Report for 1879:

BURNETT, SWAN M.—A systematic method for the education of the color sense in children. Central Dispensary, Washington, D. C.

HOFFMAN, W. J.—The Chaco cranium. Government printing office, Washington.

The practice of medicine and surgery by the aboriginal races of the Southwest. *Philadelphia Reporter*, Feb. 22.

LATHROP, W. H.—Consanguineous marriages. *Boston Med. and Surg. J.* p. 837.

LECONTE, J.—Scientific relation of sociology to biology. *Pop. Sci. Month.*, Jan. and Feb.

PARKER, A. J.—Simian characters in negro brains. *Proc. Acad. Nat. Sc. Philad.* p. 339.

PATRICK, JOHN J. R.—Dental fallacies. Rumbold. St. Louis.

WRIGHT, J. S.—Some measurements of the heads of males and females. *Arch. of Med.*, N. Y., 11, 113.

*Comparative Psychology.*—Upon this more recent field of anthropological investigation, few of our American scholars have entered. Among my notes I find only the following two references:

PSYCHOLOGICAL SCIENCE.—American anthropology. *St. Louis Eclectic Med. Jo.* April.

WILKINSON, W.—Is conscience primitive? *Pop. Sc. Month.*, March.

*Ethnography.*—The words ethnography and ethnology have gone the rounds of the anthropological vocabulary. It is not designed here to limit their application any more than to apply ethnography to descriptive works upon extant races, leaving ethnology to cover the whole subject of the anthropology of races included in our third division. The following works relate to North American races or were written by Americans:

American Indians, Notes and queries on the. *Missionary Rev.*, Sept.

BALDWIN, C. C.—Early Indian migrations in Ohio. *Am. Antiquarian*, 1, No. 4.

BICKMORE, ALBERT S.—The ethnology of the Islands of the Indian and Pacific Oceans. Ill. Am. Assoc. at Saratoga.

CAMPBELL, JOHN—On the origin of some American tribes. *Canadian Naturalist*, IX, No. 4.

- CLINT, WM.—The Aborigines of Canada under the British Crown. *Trans. Lit. and Hist. Soc.*, Quebec.
- COFFINBURY, W. L.—An exhibition of Indian character. *Am. Antiquarian*, 1, No. 4.
- DAWSON, GEORGE M.—The past and present condition of the Indians of Canada. *Canadian Naturalist*, IX, 3.
- FORCE, M. F.—Some early notices of the Indians of Ohio. Clarke. Cin.
- Iroquois and Delaware Indians, Notes on the. *Penna. Mag. of Hist.*, VIII.
- LECHEVALLIER, A.—Les Indiens Seminoles. *Naturaliste Canadien*, Aug.
- MEEKER, N. C.—The Utes of Colorado. *Am. Antiquarian*, 1, No. 4.
- Natchez and Yuchi, Notes on the. *Am. Antiquarian*, 11, No. 1.
- PARKMAN, F.—La Salle and the discovery of the Great West. Little and Brown, Boston.

Although no volume has yet been published, Major Powell succeeded, upon the breaking up of his survey, in getting an appropriation for founding a Bureau of Ethnology, under the auspices of the Smithsonian Institution. A corps of the most competent workers are now engaged in making an exhaustive study of North American Ethnography.

*Comparative Philology*.—It is now the fashion to place language among the physical sciences. The students of this department of anthropology are a class by themselves, however, and we find it convenient to give the references to philological publications separately.

- ADAM, L.—Du parler des hommes et du parler des femmes dans la langue caraïbe. *Rev. Linguistique*, July.
- BELL, ALEX. GRAHAM.—Vowel Theories. *Am. J. of Otology*, July.
- BLAKE, C. J.—The logographic value of consonant sounds in relation to their transmission by the telephone. *Am. J. of Otology*, July.
- BRÜHL, G.—On the etymology of the word *chichimecatl*. *Am. Antiquarian*, 11, 1.
- FARQUHARSON, J. A.—The phonetic elements in American languages. *Am. Antiquarian*, Jan.
- FISK, JOHN—Review of linguistic and sociological works. *No. Am. Rev.*, Aug.
- GATSCHET, A. S.—La famille linguistique Maskoki, et son dialect Hitchiti. *Congr. d. Américanistes*. 3d Sess.
- Localbenennungen aus dem Berner-Oberlande und dem Oberwallis. *Arch. d. histor. Ver. d. Kantons Bern*. 1879.
- Volk und Sprache der Mäklaks in südwestlichen Oregon. *Globus*, Braunschweig. Nos. 11, 12.
- Farberbenennungen in nordamerikanischen Sprachen. *Ztschr. f. Ethnologie*, Berlin, pp. 293-302.
- Adjectives of color in seven Indian languages. *Am. Naturalist*, pp. 475-485.
- On syllabic reduplication as observed in Indian languages, and in the Klamath language of South-western Oregon in particular. *Proc. 111th Session Am. Phil. Soc.*, 35-37.
- Mythologic text in the Klamath language of southern Oregon. *Am. Antiquarian*, 1, 161-166.
- Perez's Maya-Spanish Dictionary, reviewed in the *Am. Antiquarian*, 11, 30-32.

HENRY, V.—Esquisse d'une grammaire raisonnée de la langue aleoute. Paris, Maisonneuve. *Rev. Linguistique*, Jan.

MALLERY, GARRICK.—The Sign-language of the North American Indians. Am. Assoc., Saratoga.

PEREZ, DON JUAN PIO.—Diccionario de la Lengua Maya.

SIBLEY, DR.—Caddoquis, or Caddo Language. *Am. Naturalist*, Dec.

WILLISTON, S. W.—Indian pictographs in Western Kansas. *K's City Rev.*, May.

*Arts and Industries.*—Regarding the human race as a whole, for the time being, there are certain occupations of daily life, as well as means of gratification, which have had a history similar to that of an individual or of the race itself. We may ignore, if we please, the question of time and race, and follow the unfolding of this industry or pastime through all the stages of its growth. It is this study of comparative industry in all times and lands which lends such a charm to the writings of Mr. E. B. Tylor. In the whole range of anthropological study there is no question more puzzling than that which arises respecting the occurrence of the same art or industry in widely separated areas. On this subject I have collected the following titles:

Curious discoveries in regard to the manner of making flint implements by the aborigines and prehistoric inhabitants of America. (*Scientific American*). *Engineering and Mining Journal*, Aug. 9.

EELLS, M.—Indian Music. *Am. Antiquarian*, 1, 4.

HOWLAND, H. R.—Primitive arts and modes of life. Buff. Soc. Nat. Sc. Mar. 15. Brochure.

TYLOR, E. B.

*Sociology.*—Under the head of Sociology are included the works of such authors as Morgan and Wilson in our own country, and abroad such names as Lubbock, Tylor, McLennan, Wake, Sir Henry Maine, and towering above all, Herbert Spencer. There is no civilized country where so many distinct races of men enter into one social compact as in our own. In addition to the conglomeration of Europeans, we have the African, the Mongolian, and the Aborigines, becoming hybridized in myriad combinations. To reduce this chaos to order and to learn the social lessons which it teaches is a work worthy of our ablest minds. During the past year the following publications have appeared:

AINSLEE, J. G.—Marriage customs. *Potter's Am. Monthly*, Sept., Oct.

B. E.—The Indian as a coming citizen. *Lippincott's Mag.*, Jan.

Burial Customs. *Am. Antiquarian*, Sept.

FARRER, J. A.—Primitive manners and customs. Henry Holt.

- HOFFMAN, W. J.—Curious aboriginal customs. *Am. Naturalist*, Jan.  
 MUDGE, B. F.—Are the Indians decreasing? If so, why? *K's City Rev.*  
 REMBAUGH, Dr. A. C.—Our present race deterioration. *Penn Month.*, Ap.  
 Williams, A. M.—A grand council at Okmulgee. *Lippincott's Mag.*, Sept.

*Religion.*—There is no branch of anthropology where the "personal equation" is more complex and potent than in the treatment of religion. At the American Association Major Powell took as his theme, Savage Philosophy, adopting the views of Peschel that "In all stages of civilization, and among all races of mankind, religious emotions are always aroused by the same inward impulse, the necessity of discerning a cause or an author for every phenomenon or event." In addition to this view, which may be termed "comparative theology," there is comparative cult, including the organization of the people into clergy and laity, the places of worship with all their paraphernalia, the ritual, and religious observances. Now in the study of these phenomena each investigator is influenced by a theological or an anti-theological bias, which vitiates his testimony and deductions to a certain extent. Comparing our own country with the cultured nations of Europe, however, I think we may justly feel proud that so little bitterness and vituperation accompanies the discussion of this vexed theme: I give a few titles of publications which have come under my notice:

- EELLS, M.—The religion of the Clallam and Twana Indians. *Am. Antiquarian*, II, 1.  
 FARRER, J. A.—Fairy Lore of Savages. *Pop. Sc. Month.*, Sup., Feb.  
 GATSCHE, A. S.—Mythologic text in the Klamath language. *Am. Antiquarian*, Jan.  
 HENDERSON, J. G.—Superstitions relative to the owl. *Am. Assoc.*, Saratoga.  
     Superstitions relative to thunder. *Am. Assoc.*, Saratoga.  
 PEET, STEPHEN D.—Traces of Bible facts in the traditions of all nations. *Am. Antiquarian*, Jan.  
 POWELL, J. W.—Mythologic Philosophy. *Pop. Sc. Month.*, Nov., Dec. *Am. Assoc.*, Saratoga. Vice-President's Address.  
 SPENCER, HERBERT—The Data of Ethics. D. Appleton & Co. [This work of the distinguished author is mentioned in our list because of the great number of reviews of it which have appeared both in religious and secular journals.]  
 THOMPSON, E. H.—Atlantis not a myth. *Pop. Sc. Month.*, Oct.

*Instrumentalities of Research.*—The question is frequently asked, Where can I look for information upon the results of anthropological research? The increasing number of intelligent persons interested in such topics makes it necessary to answer the question. On the whole, the best reply the writer can give is to



mention the sources from which he has derived his own information. And, firstly, there is no Society in our country which publishes a journal similar to the Journal of the Anthropological Institute of Great Britain and Ireland; Bulletins de la Société d'Anthropologie, de Paris; Revue d'Anthropologie, in the same city; Matériaux pour l'histoire de l'homme, Toulouse; Archiv für Anthropologie, Braunschweig; Zeitschrift für Ethnologie, Berlin. Authors of works on this subject find a means of publication in the Smithsonian Institution, the Peabody Museum, Powell's Bureau of Ethnology, the Proceedings of Local Societies, the Government Surveys, and the scientific and literary periodicals. The *American Antiquarian*, published by the Rev. S. D. Peet, of Ohio, is a praiseworthy attempt to afford anthropologists a common ground upon which they may meet. Owing to this desultory manner of publication many valuable papers would be lost sight of if some index to them were not preserved. In the Index to Periodical Literature of the American Bookseller, the section of anthropology in Index Medicus, published in Washington, and the anthropological summary of the AMERICAN NATURALIST, nearly every contribution of importance finds mention by title at least. Mr. S. H. Scudder, of Boston, has published, at great pains, a list of all the learned societies of the world. Sabin and Son's Dictionary of books relating to America has reached Part LXVIII.

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#### EDITORS' TABLE.

EDITORS: A. S. PACKARD, JR., AND E. D. COPE.

— In our February number we drew attention to the then recent action of a majority of the Philadelphia Academy in reference to the policy of its management. We have since received the last number of the Proceedings for 1879, covering the months of November and December; also those for 1880 for the month of January. The former includes two hundred and fourteen pages of scientific matter, and fifty-eight pages of reports, an excellent showing for the Proceedings as a medium of publication. An inspection of the sources of this matter, however, reveals the fact that only three pages of it are the product of resident members of the Academy, or of those who have a voter's share in its

conduct. Of the eighty-eight pages issued in 1880, only two pages are from resident students, and one of these is occupied by matter already published elsewhere, for which no credit is given. We have referred to this view of the Academy's work on previous occasions, not with a view of disparaging its usefulness, but for the purpose of enforcing our assertion that its present organization is not calculated to foster native talent nor develop original research at home. And this with unrivaled facilities within easy reach, both in the form of men and means. We have ascribed this failure to the unwillingness of the Academy (1) to create collections for study; and to create or give positions of any degree of permanency to either (2) experts or (3) students; three points, it is easily perceived, absolutely essential to the accomplishment of work. We now add some new evidence of the correctness of these statements.

We quote the following from a newspaper report of an address delivered by Dr. J. L. LeConte at the recent centennial dinner of the American Philosophical Society:

"If time permitted I would be glad to mention to you what I conceive to be the proper functions of scientific societies, and the claims they have upon popular sympathy and assistance. They are, in a strict sense, neither oral teachers nor custodians; but, to use the phraseology of Smithson, so happily interpreted and applied by our venerable (in its true sense) associate, Prof. Henry, 'institutions for the increase and diffusion of knowledge among men.' I could show by many examples how, by departing from this simple path of duty, the resources of societies have been crippled and their usefulness paralyzed by indulging in the fascinating luxuries of large museums and ornate architecture. The former should be under the protection of governmental assistance, or in the care of largely-endowed institutions of learning. Voluntary contributions and unpaid labor can never support a museum which is rapidly growing; nor do such collections fulfill their functions except as appendages of universities. They soon degenerate into imperfectly classified storehouses of curiosities, occasionally visited by students desiring to verify types which have been imperfectly described. Though an investigator can be assisted, I have rarely known one made by the influence of a large museum. The material is too vast for the use of a beginner. The true life of scientific societies resides in the zeal of the members, the completeness of the library and the facilities afforded for publication. The objects for study lie everywhere around us and in us; and, as Prof. Agassiz told me many years ago, the most familiar objects, and those most frequently scrutinized, will give the most important results."

We doubt whether the views above expressed will be satisfactory even to those members of the Academy who approve the present management; although if the Academy publish princi-

pally for other institutions, it would seem appropriate that its members should also make collections for other institutions. That the president does not object to this form of suicide, may be derived from the following,<sup>1</sup> which is said to be from his pen:

"If A and B choose to bestow their treasures in Boston or elsewhere, and C prefers that the National Museum at Washington shall have his, the common cause of scientific progress is not injured, nor is the Academy any better or worse on account of such disposition. The value of scientific discovery is not contingent upon the locality where it may be made, or on the style or title of the discoverer. Every man is free to dispose of his own property as he may judge to be satisfactory to himself."

We doubt whether any other city of the civilized world presents such noble examples of self-abnegation as is implied in the above extracts. How far their fellow-citizens will be willing to share these crowns of self-immolation remains to be seen. Although a few may be found to console themselves with the pious reflection that "our loss is their gain," we doubt whether a general hosanna will arise on a distribution of important collections to other localities, excepting from the recipients.

The first speaker is pointed in his assertion as to the fate of a museum supported by voluntary labor, etc.: "They soon degenerate into imperfectly classified storehouses, etc." Has not the *kind* of labor and supervision something to do with this "degeneration?" Under incompetent hands nothing else can be expected. Prof. Agassiz says the most important results may be derived from the study of objects "around us and in us." For the entomologist this statement has an especial truth, but Prof. Agassiz took good care to make a great collection in zoölogy, palæontology and geology from all parts of the world. The position that an academy of sciences should not have a museum if it can, is absurd. As well try to run a mill without grist, or printing without type. That Philadelphia is not able or willing to have a museum, devoted first to the interests of original research, and second, for exhibition to the public, is, to say the least, highly improbable. This, of course, does not include "ornate architecture," which is not part of a museum, and which Prof. Henry very justly condemned. The Academy has indeed expended money in architecture, while its vitals have been unsupplied with food.

In further confirmation of our statements regarding the unsuitable nature of appointments to positions, we refer to the report of the Proceedings of the Academy at the end of this number of the *NATURALIST*. We add to this the further fact that one of the most able of our rising naturalists has been relieved of the scholarship which was endowed by the late A. E. Jessup, and which paid a small salary, without the offer of an equivalent place.

<sup>1</sup> Philadelphia *Evening Bulletin*, Dec. 30, 1879.

This is objectionable in view of the fact that a single unscientific person (of course an officer of the Academy) draws two of the three salaries available for special students, and spends his leisure in advancing his pecuniary interests in other directions. We have here another discrimination against the specialist, besides the many we have cited in previous articles.

Some insight into the etiology of this pathological condition may be derived from a perusal of the report of the president near the close of the volume of Proceedings for 1879, referred to at the opening of this article. The leading officer of the academy states that "original research was not the sole object of the society." "No part of the museum or library can be held in reserve for the exclusive use of any class of specialists." Here again we perceive a remarkable obliviousness to the fact that original research requires the "exclusive use" of material so long as the research may last. So long as this is not permitted, the "free access to the museum," of which the writer speaks, is a farce. And to the prevalence of this and of the views previously cited, is due the small amount of original work apparent in the publications of the institution.

— In *Nature* for March 18, the editor, in a brief notice of Prof. J. J. Stevenson's preliminary Report of the geology of portions of Colorado and New Mexico, in Capt. Wheeler's Annual Report for 1879, makes the following pertinent remarks, which are in accord with the views of this journal: "While referring to American official geological publication, we would point out the absolute necessity of reference to previous explorers. We could pick out not a few otherwise excellent reports, which are disgraced by an utter obliviousness of the existence of any earlier writings on the areas described. Without warning or explanation new names are given to formations which had already been named and described. If the original names and descriptions are defective or inaccurate, let that be stated, but in common fairness to fellow-laborers, not to speak of duty to the reading public, let us know distinctly whether we are perusing an account of ground that has never been described before, or whether we are merely getting a new rendering of facts already familiar to us. When the history of geological exploration in Colorado comes to be written how many different and rival expeditions will have to be enumerated, and in how many cases will it be found that they have recognized each other's existence?"

— We learn that Mr. Pierre Lorillard, of New York, is preparing to defray the expenses of an exploration of the ruins of Mexico and Central America. The newspapers state that the plan involves the transfer of the monuments, sculptures, etc., to Paris, to be exhibited in connection with some institution under the name of the Musée Lorillard. We hope that this may not be true. If Mr. Lorillard sustains the expense of the explora-

tion, he should require that the objects obtained shall be placed in some of the museums of New York or Washington. The educational interests of our country require all the aid that collections and museums can give, and future generations will doubtless be increasingly awake to their importance, and will hold in high esteem those who create or sustain them.



### RECENT LITERATURE.

THE ANNUAL REPORT OF THE HAYDEN SURVEY FOR 1877.<sup>1</sup>—This is another permanently valuable contribution to the geological literature of the Western United States. The unusually fine and numerous illustrations accompanying it, add much to its value. Part I, geology and palæontology, comprises over 600 pages, illustrated by seventy-six admirably executed maps and sections, and ten plates illustrating invertebrate fossils.

This part is chiefly made up of reports by the chiefs of divisions and districts, of which there are five. Dr. Endlich, in his Report on the Geology of the Sweetwater district, seems to have given special attention to the mineral resources and economic geology of that region, and it is illustrated by six admirably executed geological sections of the country traversed. Dr. White's Report on the Cretaceous fossils, illustrated by ten magnificent plates, needs no comment, as the author's well-known reputation is a sufficient guarantee of the quality of the work. Orestes St. John has had charge of the work of the Téton division, which seems to have been very thoroughly done, being illustrated by thirty-nine maps and sections of the region traversed by his party. The Green River division, in charge of Dr. A. C. Peale has done good work, care being taken to give proper credit to those who had previously worked in the same field; twenty-nine maps and sections, together with analytical and ordinary landscape views, illustrate Dr. Peale's Report on the Green River country.

Part II relates to the topographical work carried on by A. D. Wilson and Henry Gannett, topographers of the survey, by whom the work of triangulation seems to have been conducted with great care. Altogether, the volume before us is a good example of the high degree of skill attained by Dr. Hayden and his assistants, not only in carrying on their field work on a large scale, but also in presenting its results in graphic and readily available form for the use of the reading public.

RECENT BOOKS AND PAMPHLETS.—Palæontographica. Band xxvi. Heft 3. Beiträge zur Kenntniss der fossilen Fische der Karpathen, Von Dragutin Kramber-

<sup>1</sup> *Eleventh Annual Report of the United States Geological and Geographical Survey of the Territories, embracing Idaho and Wyoming*, being a Report of Progress of the Exploration for the year 1877. By F. V. Hayden, United States Geologist. 8vo, pp. 720, 86 maps, plates and sections. Washington, D. C., 1879. Advance copy, issued April, 1880.)

ger, 4to, pp. 53-68. Heft 4. Die radiolarien Fauna der Tripoli von Grotte, Provinz Girgenti in Sicilien, von Emil Stöhr. 4to, pp. 70-124, pl. vii. Cassel. Theod. Fischer. 1880.

Étude sur le Discoglosse. Par Fernand Lataste. 8vo. pp. 71, pl. iii. (Extr. des Actes de la Société Linnéenne de Bordeaux, t. xxxiii, 1879.) From the author.

On the Iron Ore of Bartlett, N. H. By J. H. Huntington. 8vo. pp. 288-292. (Extr. from Proc. Bost. Soc. Nat. Hist. xx. 1879.) From the author.

The Ethmoid Bone in Bats. By Harrison Allen, M.D. 8vo. pp. 2. (Extr. Bull. Mus. Comp. Zoology.) Feb. 1880. From the author.

On the Elongation and Plasticity of Pebbles in Conglomerates. By M. E. Wadsworth, Ph.D. 8vo. pp. 313-318. (Ext. Proc. Bost. Soc. Nat. Hist.) From the author.

The Young Scientist. Vol. I, No. 9. New York, Sept. 1878. From the publishers.

Annual Report of the Geological Survey of Wisconsin, for the year 1879. By T. C. Chamberlin, Chief Geologist. 8vo. pp. 72. Madison, Wis. 1880. From the author. With atlas in folio.

Proceedings of the Poughkeepsie Society of Natural Sciences. From Oct. 1st., 1878 to July 1st, 1879. 8vo. pp. 72. From the society.

Étude sur les Poissons et les Reptiles des Terrains Crétacés et Jurassiques supérieurs de l'Yonne. Par M. H-E. Sauvage. 8vo. pp. 20-84, pl. viii. (Ext. Bull. Soc. des Sc. hist. et nat. de l'Yonne 3 ser, t. I.) From the author.

Matériaux pour l'Histoire des Temps Quaternaires. Par Albert Gaudry. 2<sup>e</sup> Fascicule. De l'existence des Saigas en France à l'époque quaternaire. 4to, pp. 65-82, pls. iv. Paris, 1880. From the author.

Physics and Politics; an application of the principles of natural selection and heredity to political society. By Walter Bagehot. (No. 3 of Vol. 1 of Humboldt Library of Popular Science Literature.) J. Fitzgerald & Co., New York. 1880.

On the Fertilization of Yucca. By Thomas Meehan. 8vo. pp. 4. (Repr. No. Am. Entomologist.) From the author.

Proceedings of the Royal Geographical Society and Monthly Record of Geography. Nos. 2 and 3, Vol. II, 1880. From the society.

On a new Genus and Species of Harpacticida. By P. O. Christopher Aurivillius. 8vo. pp. 16, pls. iii. (Ext. K. Svenska Vet. Akad. Handlingar. Bd. 5, No. 18.) Stockholm. 1879. From the author.

Statuts et Règlement de la Société Zoologique de France. Fondée à Paris en 1876. 8vo. pp. 14. Paris, 1877. From the society.

United States Entomological Commission. Bulletin No. 3. The Cotton Worm. Summary of its natural history, with an account of its enemies, and the best means of controlling it; being a report of progress of the work of the Commission. By Chas. V. Riley, M.A., Ph.D. 8vo. pp. 144, pl. 1. Washington, Government Printing Office. 1880.

United States Entomological Commission. Bulletin No. 5. The Chinch-bug. Its history, characters, and habits, and the means of destroying it or counteracting its injuries. By Cyrus Thomas, Ph.D. Washington, 1879 (issued 1880). 8<sup>o</sup>, pp. 44.

Memoires de la Société Royale des Sciences de Liège. 8vo. Tomes VII et VIII 2<sup>e</sup> Série. Bruxelles. Decembre, 1878. From the society.

The Journal of the Franklin Institute. No. 650, Vol. cix. 1880. From the institute.

Eine neue Gattung von Scincoiden, aus New-Caledonien. By W. Peters. (Verbal communication on *Saurosincus*. Extr. from Sitzb. der Gesell. naturforschender Freunde zu Berlin. 16 Dec. 1879.) 8vo. pp. 149-159. From the author.

Über die Eintheilung der Cœcilien und insbesondere über die Gattung *Rhinatrema* und *Gymnopsis*. By W. Peters. 8vo. pp. 624-943, pl. i. (Extr. from Monatsber. d. Königl. Akad. d. Wissenschaften zu Berlin, Nov. 1879.) From the author.

A new species of *Ophrydium* (*O. adæ*). By Hermann C. Evarts, M.D. 8vo. pp. 7. (Repr. Am. Monthly Microscop. Journ. Vol. 1, No. 1.) From the author.

Über neue Amphibien des Königl. Zoologischen Museums (*Euprepes*, *Acontias*, *Typhlops*, *Zamenis*, *Spilotes*, *Ædipus*.) By W. Peters. 8vo. pp. 773-779, pl. 1. (Extr. Monatsb. d. Königl. Akad. d. Wissenschaften zu Berlin. Aug. 1879.) From the author.

Über die Amphibien und eine zu denselben gehörige neue Art. (Lepidosternon Wuchereri.) By W. Peters. 8vo. pp. 273-277, pl. 1. (Extr. Monatsb. d. Königl. Akad. d. Wissenschaften zu Berlin, März, 1879. From the author.

Über die von Hrn. Dr. G. A. Fischer in Ost afrika, von Mombas bis in das Pokomo-Land und das südliche Galla Land, unternommenen Reise eingesammelten Säugethiere. By W. Peters. 8vo. pp. 829-832. (Extr. Monatsb. d. Königl. Akad. d. Wiss. zu Berlin, Oct. 1879.) From the author.

Embryogénie de l'*Asteriscus verruculatus*. Par le Dr. J. Barrois. 8vo. pp. 8, pls. II. (Extr. de Journ. de l'Anat. et de Physiologie.) Paris. From the author.

Recherches sur le Developpement des Araignées. (Communication preliminaire.) Par le Dr. J. Barrois. 8vo. pp. 529-547, pl. 1. (Extr. de Journ. de l'Anat. et de Physiologie.) Paris. From the author.

Sur quelques espèces nouvelles au peu connues du terrain crétacé du Nord de la France. Par Charles Barrois. 8vo. pp. 449-457, pls. III. (Extr. des Ann. de la Soc. Geol. du Nord. T. IV. 1876.) From the author.

Sur l'étendue du Système tertiaire inférieur dans les Ardennes et sur les argiles a Silex. Par Dr. Chas. Barrois. 8vo. pp. 340-376. (Extr. des Ann. de la Soc. Geol. du Nord. T. VI, 1879.) From the author.

Le Marbre griotte des Pyrénées. Par le Dr. Charles Barrois. 8vo. pp. 270-300. (Extr. des Ann. de la Soc. Géol. du Nord. Tom. VI, 1879.) From the author.

Catalogue of the Pacific Coast Fungi. (Published under the direction of the California Academy of Sciences.) By H. W. Harkness, M.D., and Justin P. Moore, A.M. 8vo. pp. 46. From the author.

Prodrome des Plesiosauriens et des Élasmosauriens des Formations Jurassiques Supérieures de Boulogne-sur-Mer. Par M. H-E. Sauvage. 8vo. pp. 38, pls. II. (Extr. from Ann. des Sciences Naturelles 6<sup>e</sup> Série. T. VIII.) From the author.

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## GENERAL NOTES.

### BOTANY.

FERTILIZATION OF FLOWERS BY HUMMING-BIRDS.—Prof. Beale's note under the above title in the NATURALIST for February induces me to send the following observations, made in Alabama in 1879, which may be of some interest. The ruby throat was often seen to get nectar from both sets of glands at the base of the involucre about cotton flowers; it was constantly seen at the flowers of the low *Oenothera sinuata*; very often about those of the May-pop (*Passiflora incarnata*), the white flowered buck-eye (*Æsculus parviflora*), the wild and cultivated morning-glories, the yellow day-lily, the white oleander, several sorts of Pelargonium, the lemon, fuchsia, larkspur, malvaviscus, zinnia, "sage-bush," and "osier willow." One night just about twilight one was seen at the flowers of the gourd; and I several times saw them about the flowers of *Lobelia cardinalis*, where they usually acted much like the one spoken of in the NATURALIST for 1879, p. 431, though the flowers were by no means always visited regularly from the bottom of the raceme up. The flowers of *Erythrina herbacea* were often visited by these birds, and appear to be adapted to



fertilization by them, like the "palosabre" (*Erythrina*, sp.) described by Belt.<sup>1</sup> The malvaviscus mentioned above does not fruit in the North where I have seen it cultivated, and experiments made a few years ago on a plant in Brooklyn showed that, in that case at least, artificial crossing between different flowers on the same plant did not lead to the production of fruit. Whether this is always the case with the plant as cultivated in the North I do not know, but it fruits abundantly in Southern Alabama, where it is perfectly hardy; and yet I could not learn that there was a plant within several miles of the one on which my observations were made, so that the crossing effected by the birds was probably between flowers of one plant. This difference may be due to the difference in climate.

The species which have been mentioned are all that are recorded in my notes, though birds were seen to visit many others, and a planter laughingly said to me one day, "You'll have to note every conspicuous flower if you want a full list of those visited by humming birds," reminding me of what Delpino says in his *Ulteriori Osservazioni*, P. II, Fas. II, p. 336, "According to Gould, to number all of the flowers frequented by this species would be equivalent to repeating the name of half the plants of North America."—*William Trelease*.

CARNIVOROUS HABITS OF BEES.—Apropos of the asserted killing and eating, by hive bees, of moths captured by the bladder-flower, *Physianthus*, I would like to call the attention of readers of the *NATURALIST* to the following statement by Kirby and Spence in their *Introduction to Entomology*, Letter xx, p. 384 of the seventh edition: "Though the great mass of the food of bees is collected from flowers, they do not wholly confine themselves to a vegetable diet; for, besides the honeyed secretion of the Aphides, the possession of which they will sometimes dispute with the ants,<sup>2</sup> upon particular occasions they will eat the eggs of the queen. They are very fond also of the fluid that oozes from the cells of the pupæ, and will suck eagerly all that is fluid in their abdomen after they are destroyed by their rivals."<sup>3</sup>—*Wm. Trelease*.

FUNGI AS INSECT DESTROYERS.—Two very interesting observations, bearing on one of the methods taken by nature to prevent an over-production of insects injurious to vegetation, are recorded in the introductory portion to the Thirty-first Report of the New York State Museum of Natural History: One of these is in regard to the destruction, by a fungus, of the "seventeen-year locust," which, it will be remembered, made one of its septemdecennial visitations in 1877. This fungus, which Mr. Peck de-

<sup>1</sup> *Naturalist in Nicaragua*, p. 130.

<sup>2</sup> Abbe Boisier, quoted in Mill's on Bees, 24.

<sup>3</sup> Schirach, 45. Huber, I, 479.

scribes as belonging to a genus and species new to science, and which he names *Massospora cycadina*, develops in the abdomen of the insect, and consists almost wholly of a mass of pale yellowish or clay colored spores, having the appearance to the naked eye of a lump of whitish clay. Though the insect is not killed at once by the parasite, it is manifestly incapacitated for propagation, and thence the fungus may be said to prevent, to some extent, the injury that would otherwise be inflicted upon trees by the deposition of the Cicada's eggs. While in the Adirondack region, Mr. Peck noticed the fact that the larvæ of some unknown insect, existing in countless numbers, and feeding upon the leaves of the alder, were fast threatening the destruction of this plant. Looking beneath the bushes for the pupæ of the insect in order to obtain a clue to the latter's identity, he was surprised to find that the larvæ, in every instance, had been killed by a parasitic fungus before they had had time to undergo their transformation; and he believes that by this provision of nature the alders of the above-mentioned region have been saved from utter destruction, inasmuch as in another year they would have been completely defoliated by the larvæ had but half of those which he observed been allowed to come to maturity.—*Bulletin of the Torrey Botanical Club*.

TWINING PLANTS.—In the last number of THE AMERICAN NATURALIST I notice a short article in reference to "the direction of the twining of plants." I have given the subject some attention, and my observations show that the direction is sometimes variable. I know a large vine of *Celustrus scandens* that branches fifteen feet from the ground, one branch of which turns to the right, the other to the left, so that for over twenty feet they cross each other every four feet, and in two places are self-grafted together, each plant or branch bearing flower and fruit.—*J. C. Andras*.

THE GERM DISEASE THEORY.—A contribution to this subject has been made by Koch, who finds that certain species of Bacteria, the lowest forms of plant life, occur in certain forms of disease in certain species of animals, and that such animals inoculated with such Bacteria suffer from these diseases. Koch's method has been to inoculate mice or rabbits with decomposing animal matter, to notice what symptoms, if any, were the result of the operation, and to examine the tissues of the infected animal for the particular form of microphyte contained in the injected fluid. By injecting putrid blood or infusion of meat and thus artificially producing septicæmia in mice, the animals died in a few hours, but it was found that the Bacteria originally injected were still confined to the cellular tissue under the skin, and that they had not propagated themselves. It was also found that healthy animals inoculated with the blood of the dead animal were not injured by it. Here, then, the disease was evidently due not to living

plants, but to a soluble poison—septin or sepsin—existing with the Bacteria in the putrid fluid. But other symptoms set in in about one-third of the cases, and it was found that one-tenth of a drop of blood from any part of an infected animal was able to communicate the disease to another. Thus Koch carried the disease through seventeen successive animals, the second being infected from the first, and so on through the entire series. An examination of the blood of any of these mice revealed multitudes of minute Bacillus-like Bacteria, of definite size and form, and evidently the contagium of this particular form of traumatic septicæmia, a disease peculiar to house mice. Beside the characteristic Bacteria, occasionally a Micrococcus-form was observed, which multiplied with great rapidity, forming characteristic chains in the subcutaneous tissue; the septicæmia-Bacillus at the same time living and increasing in the blood. When injected into a mouse's ear these micrococci produced a perfectly distinctive disease, *i. e.*, necrosis of the tissues of the ear, which were penetrated through and through, and completely destroyed by the rapid multiplication of the micrococcus plants. This and experiments on rabbits and other mice showed that infection was produced by infinitesimal as well as by large doses; the Bacterium-forms for each disease seemed thoroughly characteristic, the plants differing in size, mode of occurrence, &c., the presence of these microphytes being an indispensable requisite in the development of these symptoms. On the other hand, Dr. T. R. Lewis claims that one of the chief arguments against the germ disease theory, is the fact that a septiferous fluid retains its virulence after being boiled, filtered, evaporated, or combined with acids in the form of salts, but it is argued that this is not opposed to the action of a specific poison produced by the microphytes by a process of fermentation in the decomposing fluid.

**BOTANICAL NEWS.**—We glean from the *Journal* of the Royal Microscopical Society for February, the following notes:—The germination of the maize-rust (*Ustilago maydis*), which occurs in moist air in from twenty-four to forty-eight hours, has been observed by A. Renner.—The vine mildew or false Oidium which makes its appearance from time to time in vineyards in the United States, has been detected in France on stocks imported from this country. This mildew is frequently confounded with the true Oidium, but is allied to the potato disease, being caused by a nearly allied fungus (*Peronospora viticola*).—A new form of Bacillus has been found in the liver of a badger.—The spores of a number of species of Bacterium, Vibrio, Spirochæte, and especially Leuconostoc have recently been discovered by Van Tieghem.—While Chiene and Ewart have stated that neither bacteria nor their germs exist in the healthy organs of animals, Nencki and Giacosa have ascertained by very careful experiments that they do

occur in healthy animals.—The cause of the movements of bacteria has been studied by Van Tieghem; while the ultimate cause is the contractility of the protoplasm, he thinks it is immediately due to the prolongation in places of filiform structures, to which he gives the name of appendages. These, he thinks, he has demonstrated to be the cause rather than vibratile cilia protruding through the cell wall.—A series of mycological preparations for the microscope of great value in the study of minute fungi have been made for sale by Dr. Zimmermann, of Chemnitz, in Saxony, Prussia.—The prospectus is issued of a proposed *Botanisches Central-blatt*, edited by Dr. O. Uhlworm of Leipzig. It is to be a weekly publication, consisting of information, reports, and abstracts of all papers in the various branches of botanical science published in Europe or America, titles of new books, etc. (*A. W. B.*)—The advance of the British troops into Afghanistan last year has not been without some scientific results. General Robert's force was accompanied by a naturalist, Dr. Aitcheson, who made large collections of plants, principally in the Kurum valley. These have been sent home and examined at Kew, and point to the interesting fact that in this valley we have a meeting point and intermingling of three very distinct floras, those of Western Asia, of India, and of Thibet.—(*A. W. B.*)

#### ZOOLOGY.<sup>1</sup>

NOTES ON CALIFORNIA FISHES.—*Salmonidæ*.—Among the Salmonidæ that have occurred in the markets of San Francisco during September and October, the hump-back salmon, so-called from the prominent hump upon the back in advance of the first dorsal fin, has been conspicuous.

The anadromous salmon of this coast, that is, the salmon which ascend rivers to deposit their spawn but go to the sea to feed, belong to a different group from the well-known salmon of Europe and of the Atlantic coast. This latter (*Salmo salar*) is more nearly related to our brook trouts than to our salmon.

On account of the very long hooked jaw possessed by some of our Pacific salmon, they were grouped by Dr. Suckley under the generic name of *Oncorhynchus*, and by this name they are still known to naturalists. The character mentioned is not, however, the one to be relied on to distinguish these salmon, since the hooked jaws are only fully developed in the male sex after the spawning season; the females and young having straight jaws. This may be at once seen by a glance at the young *quinnat* (the common Californian salmon) now in the market. As they lie beside the old males with their excessive development of teeth and jaws, they seem a different species. The most reliable, obvious character, is the number of the anal rays, which in our

<sup>1</sup> The departments of Ornithology and Mammalogy are conducted by Dr. ELLIOTT COVES, U. S. A.

Pacific coast salmon is seventeen, as in the European salmon and all trout.

Now there are five species of *Oncorhynchus* on this coast, and of these three are more or less hump-backed. All five are found in the Columbia, but they do not all inhabit Californian rivers. The common species, the *quinnat*, is not hump-backed. *Oncorhynchus nerka*, a somewhat hump-backed species with scales of about the same size as those of the *quinnat*, is on record from the rivers of California, but I have not yet detected its presence in our markets. This species grows as large as the common salmon, and is more cylindrical in form.

The hump-back now in the market is not this species. It has very small scales in more than two hundred transverse rows, is exceedingly compressed and thin in the body, has an excessively developed hump, and, so far as I have observed, does not reach the dimensions of the *quinnat*. These characters, taken together, prove that it is the species now known as *Oncorhynchus gorbuscha*.

I may here remark that the species of salmon and trout are probably more difficult to distinguish than those of any other tribe of fishes, partly because of the changes they undergo with age, and partly from seasonal and sexual changes. For example, the *quinnat* from the fresh water is light with round dark spots, from the sea it is of a bright steely blue. After the spawning season, as was previously observed, the lower jaw of the male acquires a more decided hook than usual. A careful examination of the teeth, of the gill-arches and of the pyloric appendages of the stomach has to be made in order to distinguish the species.

Early observers on this coast, relying on external characters, made the species much more numerous than they really are, founding their species on differences due to age, sex or season. Recently Profs. Gill and Jordan have reviewed the group, and the result is that the number of species is greatly reduced. *O. gorbuscha* includes the *gorbuscha* of Artedi, 1792, the *gibber* of Blon, 1801, and Suckley, 1861, and the *protens* of Pallas, 1811. This is par excellence the hump-back salmon, does not attain a large size, and is on record as ranging from Washington to Kamtschatka. Its occurrence in our markets proves that in the autumn it visits the neighborhood of San Francisco. The dealers tell me it is taken in the Sacramento. *O. keta*, which is on record as ranging from Oregon to Kamtschatka, includes four nominal species described by various authors (*keta*, *lagocephalus*, *scouleri*, and *confluentus*), while under *O. nerka*, which is reported to range from California to Kamtschatka, are included no less than ten nominal species, five of them described by Dr. Suckley. It is curious that the commonest species has, except when young, always been known by its Indian name of *quinnat*.

Notwithstanding the diminution in the apparent number of the Pacific coast Salmonidæ (taking the word in the sense it was used

by the older naturalists), the Pacific coast can still lay claim to sixteen species, as follows:

FRESH-WATER<sup>2</sup> SPECIES.

- Salmo irideus* Gibbons, brook trout  
 " *henshawi* Gill and Jord., Lake Tahoe silver trout.  
 " *tsuppitch* Richards, black trout.  
 " *clarkii*, Columbia River salmon trout.  
*Salvelinus spectabilis*, Gir. Charr or Dolly Varden trout.  
 " *bairdi*.  
*Coregonus williamsoni* Gir., California white-fish.

ANADROMOUS SPECIES.

- Oncorhynchus quinnat*, common salmon, Quinnat.  
 " *nerka*, dog salmon.  
 " *keta*, Ekewan.  
 " *gorbuscha*, hump-back salmon.  
 " *kennerlyi*, red salmon.

MARINE SPECIES.

- Osmerus elongatus* Ayers, slender silver smelt.  
 " *thalichthys* Ayres, Curve-mouthed silver smelt.  
*Hypomesus olidus* (Pallas) Gill, Small-mouthed Silver smelt.  
*Thalichthys pacificus* Gir., Eulachon.

The first of these (*S. irideus*) although here reckoned as a fresh-water trout, appears to have acquired the habit, in some localities at least, of descending to the ocean in the autumn. Considerable quantities of what are called salmon trout are brought to market in September, and appear to be nothing more or less than *Salmo irideus*, changed in color by residence in salt water. This is, at least, the opinion of the more intelligent dealers, and is borne out by the external characters of proportion and form of head, body and fins.

The change of color is of the same kind as that produced in the more truly anadromous species, that is, the spots disappear in great part and a blue steely tint is spread over the body. *S. irideus* is the common trout of all Californian brooks and rivers.

The eulachon, previously mentioned, is also known as "candle fish," a name which it shares with two other fat fishes of totally different families, *Anoplopoma fimbria* and *Ammodytes personatus*. If the name be finally given to the fittest, the last of these should be the true "candle fish," since not only is it fat enough to furnish the Indians with a ready made candle, but it is of an elongated cylindrical form.—*W. N. Lockington*.

THE ENGLISH SPARROW IN NEWARK, N. J.—The unusually mild weather which prevailed in the vicinity of New York city during the months of November and December, had the effect of starting the sparrows to housekeeping. About the 20th of the latter month I first noticed them carrying building material in the city of Newark, N. J., a proceeding which invited closer observation and attracted attention to their side-walk courtships, which were quite numerous, if not general.

The sparrows are very abundant in Newark, so much so that

many owners of "brown stone fronts" have put up wire screens to keep them from nesting over the windows and doors, and many other buildings are rendered unsightly by their droppings. Houses are put up for these feathered Arabs, and in Newark, as in many other places, the fiction that the sparrow is an insectivorous bird is cherished, notwithstanding the fact that they can be seen seeking their food in the middle of the street, and that their short bills indicate a preference for grain.

Grace church is the best place in the city to study sparrows, its splendid ivy-covered sides being rendered unsightly by the straws and sticks which protrude from it all the way from ten feet from the ground to the eaves, in many places one to each square foot. The noise of this colony greatly interferes with the services, so much as to make it necessary, as I am informed, to close the windows in summer; and the walk in front, under the trees, is polluted by their droppings, and many dresses have thus been ruined.

Several nests were completed in the ivy on Grace church before the 10th of January, when a few days of cold and wet weather put a stop to further desire for housekeeping for a few days. It was renewed again from the 15th to the 20th, but just how far it had advanced by the time of the Christmas snowfall, I cannot say, as the nests are difficult of access; still the fact of their building would argue that if the weather had continued mild for a week or ten days longer a brood would have been the result.—*Fred. Mather.*

A NEW PRESERVATIVE FLUID.—About six months ago the German papers brought to notice that the conservator of the University of Berlin, Mr. Wickersheimer, had invented a fluid for preserving animal as well as vegetable tissues, which was said to surpass anything that had ever been used for that purpose. Mr. Wickersheimer's laboratory was reported to be the gathering-place of all sorts of scientists, who were unanimous in commending the extraordinary beauty and elegance of the specimens which Mr. Wickersheimer showed them, a number of which had been preserved for a considerable space of time. The well-known naturalist, Carus Sterne, reported in No. 22 of the "*Gartenlaube*" as follows:

"Mr. Wickersheimer has two ways of operating with his fluid. He either injects it into the veins of the body which is to be preserved, or soaks the whole object or any part of it in the fluid. By these methods the bodies are preserved from decomposition, and after having been taken out of the fluid and dried, their natural colors as well as the elasticity of the tissue and flexibility of all the joints are secured.

"Reporter saw the body of a boy which had died several months before, lying free in the open air and having perfectly



preserved the appearance of a sleeping child. The body was of a natural softness and had preserved the appearance of life to a surprising degree.

"Mr. Wickersheimer showed a number of skeletons in which (the ligaments being preserved in their natural condition and elasticity) all the complicated movements could be executed and studied, of course much better than by aid of connecting wires and artificial joints. Some of the specimens showed beautifully the combined movements of the chest, the larynx and other parts in breathing. Several skeletons of snakes which had been treated with the fluid a year ago, allowed to show the spiral and undulatory movements of any part of the skeleton.

"But," the reporter continues, "not only the ligaments but also the vessels and membranes of animals will show the same indestructible softness and elasticity. The lungs thus prepared in connection with the wind-pipe may, even after years, be inflated by means of bellows. Such old lungs of several animals reporter saw swelling to ten times their size; the lobes became distinctly separate; the brown color gradually changed into red, and at length the whole body appeared as if taken from out of a fresh body.

"Also the digestive organs after having been cleaned, prepared and blown up, may be transformed into durable preparations which are undoubtedly far more instructive than any of those common imitations in papier-mâché.

"Further, the fluid offers great advantages for the preservation of such delicate objects which have to remain in a liquid medium. There is no discoloring, no shrinking of the objects as in alcohol (even when diluted). Sections of delicate tissues, morbid formations which have been removed by an operation, will appear after months as if in a fresh condition, and may thus be preserved for further study.

"Finally, all sorts of vegetable organisms, such as flowers, fruits, fungi, etc., will excellently preserve in this fluid and are sure to maintain their natural appearance for a long time. Reporter saw a colony of those delicate common fresh-water algae which had been in the fluid for a year and had so beautifully preserved their green color that they appeared to grow in the water in their natural condition."

Some time previous to this report, Mr. Wickersheimer had offered his invention to the Prussian government for a reasonable compensation. The government accepted the offer and appointed a committee of experts to examine the fluid and test its qualities and effects. The very satisfactory results of these examinations have been quite recently published by the State's-Secretary of the Department of Instruction in the official "*Staatsanzeiger*,"

together with the following formula for the preparation of the fluid:

In 3000 grammes of boiling water dissolve

Alum.....	100 grammes.
Common Salt.....	25 "
Saltpetre.....	12 "
Potash.....	60 "
Arsenious Acid.....	10 "

After cooling and filtering, add to every ten litres of the solution, four litres of glycerine and one litre of methyl. alcohol.

The "Staatsanzeiger" says:

"The method of application differs according to the nature of the objects that are to be preserved. Anatomical preparations, whole bodies, etc., that are to be preserved dry, are laid (according to their size) from six to twelve days into the fluid, then taken out and dried in the open air. The ligaments, the muscles, etc., will now remain soft and flexible, so that at any time the natural movements can be executed.

"Hollow organs, such as the lungs, bowels, etc., must be filled with the preserving fluid, then laid in a vessel containing the same fluid and afterwards dried after the fluid has been poured out and the objects have been distended with air.

"Smaller animals, such as crabs, beetles, lizards, frogs, etc., if the natural colors are to be preserved unchanged, are not to be dried, but put up in the fluid.

"If human or animal bodies are to be preserved for a longer space of time before they are used for scientific purposes, it is sufficient to inject the fluid. Two litres, f. i., will suffice for a child of two years; about five litres are required for an adult. By this treatment the muscles will appear (even after years, when sections are made) as if in a fresh condition. If thus injected human bodies are preserved in the open air, they will gradually lose their fresh appearance and the epidermis will assume a brownish shade. But even this can be avoided if the fluid is externally rubbed into the skin, and if the access of air is prevented as far as possible.

"This latter treatment may be recommended for corpses that are to be exhibited to the public or are to be preserved for some time before they are buried, for the features will remain unchanged in their expression and color, and there will not any smell be perceptible.

"For the real embalming a method of combined injection and preservation in the fluid is to be applied. The bodies, after being injected, are kept in tight cases, being wrapped in clothes which have been saturated with the solution."—*W. Barbeck.*

THE SPOTTED SALAMANDER.—Every one who has collected water-plants or animals in the marsh-pools or quiet streams of

the Eastern United States is familiar with the spotted salamander, or water newt (*Diemyctylus viridescens* R.).

In their adult dress (olive-brown above, yellow beneath, and a row of vermilion spots along each side) they can be seen in numbers, from early April till the middle of June, in shallow pools, basking on the surface, or floating motionless with the slow current, or walking among the submerged plants. It is the only salamander I know whose habits are so diurnal that it enjoys the sunshine. I have caught them by the dozen at noon on sunny days. In the spring they prefer open pools or streams of slow-moving water where there are no trees, but plenty of plants and tufts of grass. But later in the year, when the sun becomes torrid, when the streams of the marshes are shrunken, and temporary frog ponds are nothing but patches of dried and cracked mud, the adult spotted salamander is seldom seen. I suppose they are hidden among the roots and tufts of grass. At least my specimens in confinement always get in such places.

I have kept them in a box filled with earth, grass and moss, in which there was always a dish of water standing, but they did not care to stay long at a time in the water. Sometimes they would not remain in it for weeks, although they walked through it many times in crawling around; and they ate and were as lively as when caught.

In the breeding season, when they spend a greater part, if not all the time, in the water, their colors are brighter and the black markings are very distinct. The compressed tail has a fin-like extension of the integument above and below, which enables them to swim with ease. Afterwards the colors become dull and the fin is absorbed. In these particulars they resemble what is said of the *Triton* (?) *cristatus* of Europe.

The eggs, which I have seen, are glued singly in the axils of leaves, or the terminal whorl of finely-divided leaves, or folded up in grass blades. Often the leaves are stuck so close to the egg that the latter is not visible. Prof. E. D. Cope has noticed the eggs of *D. viridescens* "laid singly on leaves of *Myriophyllum* which adhere to the glutinous egg, concealing it." (Packard's *Zoölogy*, 1879, p. 479.) My observations differ from those of Prof. Verrill and S. J. Smith (*AMERICAN NATURALIST*, Vol. III, p. 158), who state that they found "rounded masses, like frogs' eggs, on the stems of water plants." The larvæ, too, that were hatched from the eggs they found had "rather stout bodies and broad heads." All the larvæ I ever saw of *D. viridescens* have been slender, with narrow heads and pointed noses. They can be distinguished at all times from the stout broad-headed larvæ of *Amblystoma punctatum*. I have caught adult specimens in the breeding season, placed them among plants where there were no eggs. They laid eggs in the axils of the plants, and the eggs hatched to larval spotted salamanders. In the manner of placing the eggs,

they agree with what Prof. Owen says of the *Triton cristatus* and *L. punctatus*. The eggs are about an eighth of an inch long, elliptical, with a tough envelope, and greenish fluid surrounds the yolk part. They are laid early in April or May, according to the season. The larvæ are very timid. I have kept them till they became terrestrial and had yellow spots along their olive-green sides, but they would not eat, and died in about a week. I am very sorry not to have been able to keep any till they reached the red eft stage. Their dying so young makes a break in the chain of observed facts that prove the red eft to be a young form of the spotted salamander.

The red eft (*D. miniatus* Raf.) was described as a different species on account of its color, which is orange-red with vermilion spots. Lorne still holds that it is a distinct species, or a variety. Dr. Hallowell first suggested that they were the same species (Proc. Acad. Nat. Sci., 1856), and Prof. Cope has maintained the same opinion (Proceed. Phila. Acad., 1859). Mr. H. A. Kelly kept some red-ests till they became spotted salamanders (AMERICAN NATURALIST, Vol. XII, p. 399). I have also observed the change several times. All the red ests I have seen were small. I believe, but am not able to prove at present, that the young *D. viridescens* attains its red garb the summer it is hatched, remains that color about a year, then gradually becomes duller as it attains full size. I have found red ests in dead wood some distance from water, but never in the water; I found one November 1, after two severe frosts, under a loose stone near a marsh. I have kept *D. viridescens*, *A. punctatum* and *Desmognathus fusca* alive for more than a year at a time. The first two species became so tame that they would stretch up their heads, expecting to be fed, whenever they heard my voice. I have seen *D. viridescens* eat tadpoles. They never seem to be able to get enough of them. The salamander puts his nose close up to the tadpole and remains perfectly still. If the tadpole does not stir, his life is saved, for the salamander soon moves off; but if he wriggles the least bit he is down the throat of his enemy in an instant. In taking bits of meat from a wire, they slowly open the mouth, protrude the tongue, and gently pull it off. *A. punctatum* snaps off the meat with a quick jerk.

I have never seen any salamanders use the fore foot as a hand in adjusting food in the mouth, or for removing objectionable pieces, but I have very often seen my tree toads do so.

I have frequently seen the *D. viridescens* shed its skin. They are restless before shedding and refuse food, and are weak for some time after the skin is removed. After the skin is loosened, they press it from the head and front legs by rubbing against some projection in the box, presenting different sides during the operation. Sometimes they remove the whole skin in this manner. At other times, after the old skin was removed from the

arms, I have seen them push it from the rest of the body by alternately pressing against the sides with their hand-like front feet, in the same way that a person might strip off a tight garment. The skinning takes an hour or more, and after the integument is off they roll it up and swallow it.

If kept in a warm room salamanders take food regularly during the winter and seem as lively as in summer. Tree toads kept in the same room will not eat. On the approach of cold weather they dig their way under sods and remain buried and torpid till spring. This would indicate that hybernation is not as settled a habit with these two species of salamanders as with the tree toads.—*S. P. Monks.*

GROWTH AS A FUNCTION OF CELLS.—Dr. Charles Sedgwick Minot has published an article in the Proceedings of the Boston Society of Natural History on "Growth as a Function of Cells." This essay is an attempt to give an exact analysis of the problem of growth. The author considers that growth depends upon an impulse created at the time when the *ovum* is impregnated; this impulse he terms rejuvenation, because the vital power is made young again in a new cycle of cells. The old cycle of cells passes away, the parent dies, but a new egg-cell is produced endowed with an extraordinary power of division, which causes the birth of successive generations of cells. Now usually the number of cells is doubled at every division, that being the least possible increase, hence the number of cells must increase in geometrical progression; therefore, the growth of every animal would be indefinite were there not an opposing influence. This opposing influence cannot be the loss of a part of the cells, as when part of the skin peels off, for this loss is too slight to counterbalance the multiplication. The explanation is, that the intervals between the births of two successive generations of cells continually increases, or in other words the frequency of the divisions continually diminishes. This Dr. Minot calls the phenomenon of *senescence*, to which he attributes the utmost importance, as a vital phenomenon common to all animals, yet hitherto entirely unstudied. He says. "From our point of view this change (in the frequency of division) is the most important alteration produced by senescence; that it really occurs is not only a deduction, but is shown by actual observation, for no one can question that the division of the cells during segmentation of the yolk proceeds at shorter intervals than during adult life; thus in an egg say eight or ten, perhaps more, generations of cells may be born in the course of a single day, all the cells dividing; but we cannot for an instant imagine that all the cells of the human adult, for example, divide upon an average even once a day, probably \* \* \* \* not \* \* \* \* even once a year." But the size or weight of the whole animal depends not only

upon the number but also on the volume and weight of the cells. Dr. Minot therefore discusses the laws which govern the variations of the size of cells. The relations of growth to the size of animals is next considered, the conclusion being drawn that the rapidity of the senescence determines the size of the animal, because the more rapidly the frequency of the cell divisions diminishes, the sooner will growth cease and the smaller will the animal remain, so that in this respect senescence exercises a fundamental influence. This, is, we believe, the only scientific attempt to explain the reason why animals are of different sizes. Finally by a novel reasoning the conclusion is drawn, that although the animal grows in three dimensions, yet the growth of the cells is confined to two dimensions of space. For the detailed arguments supporting the author's conclusions, the original article must be consulted.

SCOLOPENDRELLA AS THE TYPE OF A NEW ORDER OF ARTICULATES (SYMPHYLA).—In examining a series of specimens of *Scolopendrella notacantha* Gerv., and a species which I believe to differ from *S. immaculata* Newp., and which I have called *S. gratie* (both forms collected in the Philadelphia park), I find characters which appear to warrant the creation of an ordinal division for their reception. The new group may be characterized in accordance with my observations as follows:

*Head essentially insectiform*, or, more specifically, like that of *Campodea*, with *mandibles, maxillæ and apparently a ligula*. The labrum and labium are well defined, and the former is separated from the *epicranial pieces* by a *well-marked suture*. Antennæ 14–28 articulate. Body with thirteen segments (exclusive of head), to which are appended not more than twelve pairs of *five-jointed legs, each terminated by a pair of claws, as in insects*. At the bases of each pair of legs a pair of simple hairy appendages are attached, except to the first or postcephalic: these are fully three times as large in *S. gratie* as in the other species. Caudal stylets in a single pair, tapering, unjointed.

*Genital orifice on the ventral side of the body opening on the third or fourth body-segment in both sexes*. In one sex the opening is a *simple pore*, in the other a *longitudinal cleft*, closed by means of an oblong chitinous piece on either side, the two together occupying a subquadrate space. Heart, dorsal; *tracheal system represented by a series of simple tubular arches, without a spiral filament, which arise from openings on the ventral surface of the animal, inside the bases of the legs, widening and passing upwards to end apparently in close relation with the dorsal vessel*. Intestine straight, with two very long, tortuous malpighian tubules opening into it at the posterior third (*S. notacantha*).

The genital glands, as well as the nervous system, I have not made out with any degree of certainty. The muscles are dis-

tinctly striated, and the blood corpuscles small. The intestine has the portion in front of the rectum dilated; this is especially notable in *S. gratia*, where this part of the alimentary canal is usually filled with the remains of undigested vegetable food. The distal, thin, laminar elements of the jaws and maxillæ are deeply toothed and much resemble those of *Campodea*, as figured by Meinert.

This form, as interpreted above, becomes of the highest interest to the zoölogist, and if the writer is not mistaken, the biunguiculate legs and their nearly complete correspondence in number with the rudimentary abdominal and functional thoracic limbs of the *Thysanura*, especially *Machilis* and *Lepisma*, which also have basal appendages to the legs, indicate as much affinity with insects as with myriapods, and may indeed be looked upon, perhaps, as representing the last survival of the form from which insects may be supposed to have descended. I name the new group *Symphyla*, in reference to the singular combination of myriapodous, insectean and thysanurous characters which it presents.—*John A. Ryder.*

NOTE ON A LARVAL LITHOBIUS-LIKE MYRIAPOD.—I recently met with a very small specimen of this type of myriapod with seven pairs of legs. The claws are simple, as in the adults, the same as I have observed in larval specimens of *Zulus* and *Trichopetalum*, and in both adult and immature specimens of *Eurypauropus*. The mouth parts are a miniature of those of the adult. The specimen was nearly an eighth of an inch long.—*J. A. R.*

TRICHOPETALUM.—I have found Harger's *T. lunatum* in great abundance in the Philadelphia park, which greatly extends the range of this Lysiopetalid myriapod.—*J. A. R.*

DR. CHAPMAN ON THE PLACENTA OF ELEPHAS.—The birth of an elephant at full term (twenty months and twenty days, according to the records kept by the keepers at Dr. Chapman's request), in Cooper & Bailey's menagerie in this city, afforded a unique opportunity to study the mature placenta of these huge animals. The placenta proper was found to be *zonary*, and was believed to have encircled the foetal elephant during gestation. The amnion and chorion formed two large oblong pouches, one within the other and were fused together equatorially at their narrowest diameters, the point where the placental villi were developed. On either side of the placental zone of villi, the numerous cotyledons were developed. The placentation was found to be essentially non-deciduate, and diffuse in character, with a zonary form; this combination of characters renders Dr. Chapman's observations of great interest and systematic importance. No naturalist of recent times has ever had so good an opportunity to study this structure; the specimen described by Professor Owen is sup-



posed, from its size, to have been immature, whilst the interpretations, figures, and descriptions of the parts by the older authors are necessarily unsatisfactory, owing to their lack of comparative knowledge.

ZOOLOGICAL NEWS.—A new class of marine silicious Rhizopods, called by Haeckel *Phaeodaria*, rich in specific forms and remarkable in many respects, is described in *Nature* by this indefatigable observer. Over 2000 "species" have been collected by the *Challenger* expedition. The greater number of the species are visible to the naked eye.—The development of *Amblystoma punctatum* is described by Dr. S. Clarke, with excellent figures, in the Studies from the biological laboratory of the Johns Hopkins University.—Considerable has been done by the Scandinavian naturalists concerning the singular Crustacean parasites of the sea worms, these Lernæan forms being attached to the bodies of the worms. A number of new forms of much interest have been described and elegantly figured by Levisen in the Proceedings of the Natural History Society of Copenhagen.—Hewitson and Moore's Descriptions of New Indian Lepidopterous insects is to appear in parts. For the first part we are indebted to Dr. Hayden. A number of forms are related to American species, hence this publication is of interest to lepidopterists in America.—The death of Dr. Boisduval, the well-known lepidopterist, who described so many North American butterflies and moths, is recorded. He attained the age of eighty-one years.

#### ANTHROPOLOGY.<sup>1</sup>

PEABODY MUSEUM AT CAMBRIDGE.—Prof. F. W. Putnam, in three communications to the Boston Society of Natural History, during October and December gave an account of the work of the Peabody Museum. The first had reference to chambered barrows, already mentioned. The second to ancient mounds and burial places in Cumberland Valley, Tennessee. Several thousand ancient stone graves have been opened. A walled town on the Lindsley estate, twelve acres in extent, enclosed by a bank and ditch was described. A mound in the area contained sixty human skeletons, each in a carefully made stone grave, the graves being arranged in two rows forming four sides of a square, and in three layers. About seventy ground plans of ancient houses were traced out. Under the floors of hard burnt clay were the graves of children, from one to four under each house. The third paper treated of the ornamentation of pottery. The author concludes from a wide induction that the seemingly useless appendages of more refined ceramic ware are survivals of useful parts in a ruder age, and that the study of the ornamentation of pottery will furnish an important clue to the progress of culture.

<sup>1</sup>Edited by Prof. ORIS T. MASON, Columbian College, Washington, D. C.

For about two years Mr. J. Francis Le Baron, Chief Engineer of the St. John's and Indian Rivers railroad at Titusville, Florida, has been engaged in making a reconnoissance of the archæological remains in Eastern Florida for the museum. During this period he has located on a copy of a government map of Florida, published by the War Department, no less than 173 stations, comprising shell-heaps, burial-mounds and fortifications, in a region extending about 300 miles south of the mouth of the St. John's, and inland along that river and over-land to Lake Okeechobee. The majority of the stations are, however, on the St. John's and Indian rivers. Taken in connection with Prof. Wyman's account of the shell-heaps of the St. John's river, the map and accompanying report by Mr. Le Baron forms a valuable addition to our knowledge of the position and number of the prehistoric sites in Florida. Mr. Le Baron has also in his report called attention to several groups of tumuli of special interest which should be explored in detail if funds can be obtained for the purpose, for they are of a different character from the ordinary shell-heaps and burial-mounds along the St. John's and the coast. The report and map by Mr. Le Baron will prove of considerable interest and importance in connection with the arrangement of the large amount of material which we have from the shell-heaps of Florida, consisting principally of the collections made by the late Prof. Wyman, and the proper time for its publication will be when the collections in that department of the museum shall be placed on exhibition.

**THE DEPARTMENT OF ANTHROPOLOGY OF THE BRITISH ASSOCIATION, HELD IN SHEFFIELD, 1879.**—The Report of this Association is a model in punctuality and preparation. The following is a correct list of papers.

BALL, V.—On the forms and geographical distribution of ancient stone implements in India.

CAMERON, COMMANDER.—On the manners and customs of the people of Urua, Central Africa.

CARKE, HYDE.—On the Yarra and the languages of Australia in connection with those of the Mozambique and Portuguese Africa.

On High Africa as the center of a white race.

DAVIS, JAMES W.—On the discovery of certain pockets of chipped flints beneath the peat on the Yorkshire moors, near Halifax.

On an elaborately finished Celt found on the moors, near Marsden.

DAWKINS, W. BOYD.—On the geological evidence of the antiquity of Man.

DE BRAZZA, COMTE SAVORNAN.—On the native races of Gaboon and Ogowé.

FARRER, J. A.—On savage and civilized warfare.

HARRISON, J. PARK.—The profile of the ancient Greeks.

KEANE, A. H.—On the relations of the Indo-Chinese and Inter-Oceanic races and languages.

KNOWLES, W. J.—On flint implements in the Valley of the Bann.

On some curious leathern and wooden objects from Tullyreagh bog, County Antrim.

LANG, ANDREW.—On the origin of Fetishism.

MILNE, JOHN.—On the stone-age in Japan.

MOSS, EDWARD L.—On a collection of organic remains from the Kitchen-middens of Hissarlik.

OPPERT, GUSTAV.—On the classification of languages on the basis of ethnology.

RENÉ, DR.—On the discovery of animal mounds in the Pyrenees.

Evidence of early historic events and pre-historic customs by perpetuation of design in art and manufacture in later, and even in present, times.

PINTO, DE SERPA.—On the native races of the head-waters of the Zambesi.

ROBERTS, C.—A classification of the physical conditions of life.

SKERTCHLEY, SYDNEY B. J.—Evidence of the existence of palæolithic man during the glacial period in East Anglia.

On a new estimate of the date of the neolithic age.

On the survival of the neolithic period at Brandon, Suffolk.

TUKE, D. HACK.—On the Cagots.

TYLOR, E. BURNETT, Chairman.—The presidential address.

TYLOR, A.—On certain inventions illustrating the working of the human mind.

VAMBÉRY, ARMINIUS.—On the Turcomans between the Caspian and Merv.

WAKE, C. STANISLAND.—Notes on the Polynesian races.

ARCHÆOLOGY IN INDIANA.—The volume containing the eighth, ninth and tenth annual reports of the geological survey of Indiana during 1876-77-78, by Prof. E. T. Cox, devotes the space from page 121 to page 153 to antiquities. In the first chapter descriptions and surveys of new works and mounds are given accompanied by accurate maps. The second chapter is an address by Mr. Cox before the State Archæological Association of Indiana, which closes with this most excellent sentence, "Let us, therefore, attend strictly to detailing facts of observation, and they are sure to lead to a correct solution of all problems within the compass of the human mind."

ANTHROPOLOGICAL NEWS.—Tenth general meeting of the German Anthropological Society, at Strassburg, on the 11th, 12th and 13th of August, 1879, in Cor.-Bl. d. Deutsch. Gesellsch. f. Anthrop., etc. Nos. 9, 10 and 11. The papers and discussions reported are of great importance locally, but few of them were of general interest. Mr. E. Von Tröltzsch presented a prehistoric chart of Southern Germany and Switzerland, which is a marvel of patience and skill in the use of graphic signs and colors.

The second part of the twelfth volume of *Archiv für Anthropologie*, 1879, contains the following communications:

Der Steisshaarwirbel (vertex coccygeus), die Steissbeinglaze (glabella coccygea), und das Steissbeingrübchen (foveola coccygea), wahrscheinliche Ueberbleibsel embryonaler Formen, in der Steissbeingegend beim ungeborenen, neugeborenen, und erwachsenen Menschen; by A. Ecker, with two plates, pp. 129-156.

Kraniologische Untersuchungen, by Dr. Emil Schmidt (Fortsetzung und Schluss), pp. 157-200.

Ueber die prähistorischen Opferstätten am Uralgebirge, by Alexander Teplouchoff in Illinskoje near Perm (with two plates).

Neuer Messapparat für photographische Aufnahmen von Lebenden und von Schädeln oder skeletten, by Dr. Gottschow (with one plate).

Kleinere Mittheilungen, including notices of the Moscow Exposition, Gatschet's "Adjectives of Color," Kulischer's "Jus primæ noctis," and Wankel's "Prähistorische Eisenschmelz und Schmiedestätten in Mähren."

Prof. Ecker, the author of the first article, published in *Globus*, 1878, xxxiii, 177, a paper upon abnormal hairiness in men, especially with reference to the so-called hairy men. The present paper is a continuation and extension of those studies in thoroughness, although a great restriction of the area of observation. While the author was endeavoring to ascertain the significance of distribution of hair over the fœtus in general, and of the *trichosis sacralis* in particular, his attention was arrested not only by the hair-whorl near the coccyx, but also by the bald place (glabella), and the dimple (foveola coccygea). The author, after making these discoveries independently, found that others also had mentioned the dimple and the hair-whorl, while the *glabella* had not been noticed at all, and the connection of all these characteristics into a single study was entirely original with him. The design of the paper is to describe the phenomena separately, to ascertain their mutual relationships, and to arrive, if possible, at their origin and meaning.

The Bureau of Ethnology at Washington, designing in the future to publish a large work upon the gesture speech of mankind, has issued a preliminary quarto *fasciculus* of seventy-two pages prepared by Col. Garrick Mallery, and entitled, "Introduction to the study of the sign language among the North American Indians as illustrating the gesture speech of mankind." The final publication will be a collection of all signs, symbols and facial expressions used in conveying thought, by deaf-mutes and by tribes beyond North America, as well as by our own aborigines.

The writer dwells first upon the practical value of the sign language both in communication with living tribes and for the interpretation of native picture writing, "the sole form of aboriginal records, the impress upon bark, skins, or rocks of the evanescent air picture which in pigment or carving preserve their skeleton outline." The next chapter treats of the origin and extent of gesture speech, holding that the latter preceded articulate language in importance, which remained rudimentary long after gesture had become an art. The preponderance of authority is to the effect that man, when in possession of all his faculties, did not make a deliberate choice between voice and gesture, both being originally instinctive, as both are now; and there never was a time when one was used to the exclusion of the other. With the voice he at first imitated the few sounds of nature, while with gesture he exhibited actions, motions, positions, forms, dimensions, directions, distances, and their derivatives. It is enough to admit that the connection between them was so early and intimate that the gestures, in the wide sense of presenting ideas under physical forms, had a formative effect upon many words; that they exhibit the earliest condition of the human mind; are traced from the remotest antiquity among all peoples possessing records, and are universally prevalent in the savage stage of social evolution. Col. Mallery next proceeds to demol-

ish the oft-repeated story that there are tribes that cannot converse in the dark, alleging in response that individuals of those American tribes especially instanced, often in their domestic *abandon*, wrap themselves in robes or blankets with only breathing holes before the nose, and chatter away for hours. The common belief in an universal sign language shares the same fate at the hand of the author. In numerous instances there is an entire discrepancy between the signs made by different bodies of Indians to express the same idea. The pages of authorities, 16-18, are given in corroboration of the author's view. Then follows a series of variant signs, diverse both in conception and execution, with further illustrations, including speeches and stories in signs, with advice to collectors, accompanied with drawings to guide them in recording their observations.

We have called attention previously to the *American Art Review*, edited by Messrs. S. R. Koehler, Wm. C. Prime and Charles C. Perkins, and published monthly, in Boston, by Estes & Lauriat. As a medium of communication between students of the fine arts, it does not come within the pale of our notice; but the editors, taking the view that art is a factor in civilization, have engaged the most distinguished specialists, including Mr. Bancroft and Prof. Putnam to contribute an illustrated paper to each number upon American aboriginal art in its ancient and modern phases. In this view the journal commends itself to the archæologists of our country as eminently worthy of their support.

The following titles of works and treatises may draw attention to something of interest to our readers. They are compiled chiefly from *The American Bookseller and Index Medicus*:

- Antiquary: A magazine devoted to the study of the past. Edited by Edward Walford. J. W. Bouton, N. Y.
- Antropologicheskaja vistavka, 1879, go goda (Anthrop. Exposition at Moscow in 1879.) Moskva, 1879.
- Aryas, Discussion sur l'origine des. *Bull. Soc. Anthropol. de Paris*, 1879, II, 344, 443.
- AYRTON, MATILDA CHAPLIN.—Recherches sur les dimensions générales et sur les développement du corps chez les Japonais. Paris, 1879.
- B., J.—Statistique anthropométrique et médicale des élèves des écoles primaires de Bruxelles. *Ann. de demog. internat.* Paris, 1879, III.
- BEARD, G. M.—English and American physique. *N. Am. Rev.* 1879, CXXIX.
- BENEDIKT, M.—Ueber Kranometrie. *Centralbl. f. Nervenhe.* Coblenz, 1879, II.
- BLEICHER.—Essai sur les temps préhistoriques en Alsace. Nancy, 1879.
- BORLASE, W. C.—Indian money cowrie in a British barrow. *Antiquary*, Jan.
- BORDIER.—Sur les crânes d'assassins. *Bull. Soc. d'Anthrop. de Paris*, 1879.
- BROCA, PAUL.—Crâne et cerveau d'un homme atteint de la déformation toulousaine. *Bull. Soc. d'Anthrop. de Paris*, 1879, II.
- Sur la détermination de l'âge moyen. *Bull. Soc. d'Anthrop. de Paris*, 1879, III.
- Sur un crâne de Fellah et sur l'usure des dents. *Bull. Soc. d'Anthrop. de Paris*, 1879, II.
- BUJACK.—Auszug aus dem Catalog der Sammlung der Allerthumsgesellschaft Prussia. *Arch. f. Anthropol.*, 1879, XII, 75-89.
- COTTEAU.—Les sciences anthropologiques a l'exposition universelle de 1878. Auxerre, 1879.

- DUBNIDON, P.—Le Culte des Morts et les Cimetières. *Rev. Occidentale*, Jan.
- DURAND.—Sur les races nobles de l'Aveyron. *Bull. Soc. d'Anthrop. de Paris*, 1879, II, 421.
- GARCIN, C.—La tête et le crâne d'un Neo-Caledonien. *Marseille Med.*, 1879, XVI.
- GEOFFROY, J.—La connaissance et la denomination des couleurs. *Bull. Soc. d'Anthrop. de Paris*, 1879, II.
- GIGLIOLI, E. H.—Nuove notizie sui popoli negroidi degli Asia e specialmente sui Negriti. *Archiv. per l'Anthrop.* Firenze, 1879, IX.
- GIRARD, J.—Migrations Africaines. *Bull. d. l. Soc. Geographie*, Oct.
- GOMME, G. L.—Folk-lore and the Folk-lore Society. *Antiquary*, Jan.
- HOFFMANN, W.—Russian Superstitions. *Penn Month.*, Jan.
- Instructions générales pour les recherches anthropologiques à faire sur le vivant. Paris, 1879.
- KOTELMANN, L.—Die Augen von 9 Lapländern, 3 Patagoniern, 13 Nubiern, und 1 neger vom weissen Nil. *Berlin Klein Wehnschr.*, 1879, XVI.
- LE BON.—Des differences de volume du crâne suivant les races, les individus, et les sexes. [Extract from his memoir crowned by the Soc. d'Anthrop. de Paris with the first prize.] *Gaz. d'hôp.* Paris, 1879, LII.
- LEBON, G.—Resultats fournis par la mesure des capacites de crânes ayant appartenu a des hommes célèbres. *Compt. rend. Acad. d. Sc.* Paris, 1879, LXXXIX.
- Marriage Proposals, Curious. *Chambers' Journ.*, Jan.
- MEEH, K.—Oberflächenmessungen des menschlichen Körpers. *Ztschr. f. Biol.* München, 1879, XV.
- MODEGLIANI, L.—Di alcune linee faciali trasverse nel cranio di varie razze. *Arch. per l'Anthrop.* Firenze, 1879, IX.
- MONTAGUE, C.—About Kissing. *Potter's Am. Month.*, Feb.
- PARKER, Dr. A. J.—On the brain of a Chimpanzee. *N. Y. Medical Record*, Jan.
- RAMON DE TORRES MARTINEZ, J.—Contribucion a la antropologia, Forma el hombre un reino aparte dentro del órden de la creacion? *Encicl. méd.-farm.* Barcelona, 1879, III.
- RICE, L.—The Ganga Kings. *Madras J. of Literature*, I.
- ROTH, E.—Beitrag zur Erblichkeitsfrage. *Berlin Klin. Wehnschr.* 1879, XVI.
- SABIN, JOSEPH—A Dictionary of Books relating to America. Parts 60–70. Joseph Sabin and Sons, New York.
- SCHÖLER—Ueber die Stellung der Ophthalmologie zur Anthropologie. *Arch. f. path. Anat.* Berlin, 1879, LXXVIII.
- STAGE, G. G.—Weight in the first year. *Copenhagen*, 1879.
- TARUFFI, C.—Dell' antropometria e delle anomalie della colonna vertebrale. *Ann. univ. di med. e chir.* Milano, 1879, CCXXLIX.
- VAUGHN, MGR.—L'Homme: son origine, sa destinee. *Annales d. Philos. Chretienne*, Jan.
- Vedas, Antiquity of the. *Theosophist*, Oct., 1879.
- WEISGERBER, HENRI.—De l'indico thoracique. Paris, 1879.
- WEST, E. P.—A buried race in Kansas. *Kansas City Rev.*, Jan.
- WIENER, C.—Gran-Chimu et la ville de Cuzco. *Bull. d. l. Soc. de Geog.*, Oct.
- WOINARSKI, S. E. A. Z.—Some statistics of the length and weight of children born in the Lying-in Hospital, Melbourne. *Austral. M. Journ.* Melbourne, 1879, I.

#### GEOLOGY AND PALÆONTOLOGY.

A NEW GENUS OF TAPIROIDS.—In 1873 I obtained the anterior part of the skeleton of a tapiroid mammal from the Eocene beds of the Washakie basin in south-western Wyoming. Having recently had occasion to examine the specimen, on removing the matrix I was surprised to find that it only possessed three digits

in the anterior foot, the fourth (fifth) being represented by a rudimental metacarpal. It thus differs from *Hyrachyus*, and allied genera of the Eocene, and places itself in direct association with the three-toed forms of the Lower Miocene. The dentition is however that of *Hyrachyus*. The premolars differ from the true molars in form, and the transverse crests of the latter are uninterrupted. There is a diastema, in which it differs from (*Helalectes*) *Tapirus*. (See Scott, Osborn and Spier on this genus.) The inferior molars are like those of the rhinoceroses. The ulna and radius are distinct. I call this genus thus characterized, *Triplopus*, and the species *T. cubitalis*, with the following description:

The interorbital region of the skull is wide and flat, and the sagittal crest is low. The muzzle is rather short, and the anterior border of the orbit marks about the middle of the first true molar. The posterior external crescent of the superior true molars is without bounding or dividing ridge, while the median ridge of the anterior crescent is very strong. The same is true of the confluent crescents of the premolars. The crests of the inferior true molars have strong ridges descending anteriorly from their outer extremities. The fore-limb, especially the cubitus, is rather slender. Length of superior molar series, m. .055; of true molars, .030; of superior diastema, .012; interorbital width, .049; length of humerus, .111; of radius, .143; of median metacarpus, .066; of median digit, .028. The species was about the size of a fox. The form has a good claim to be regarded as the type ancestral to *Hyracodon*.—*E. D. Cope*.

THE STRUCTURE OF THE PERMIAN GANOCEPHALA.—Examination of abundant material shows the correctness of my anticipation (this Journal 1878, 633), that the vertebræ of the large batrachian *Eryops*, would turn out to have the structure found in *Rhachitonus*. This genus then must be referred to the same sub-order as *Trimerorhachis*, and probably *Actinodon* Gaudry, which will be characterized by the segmented vertebral centra. If European authors are correct in stating that the vertebræ of the *Labyrinthodontia* have undivided centra, the sub-order above mentioned, must probably retain the name of *Ganocephala*, with additional characters.

The identification of the scapular arch in *Eryops*, and of the pelvic arch in *Eryops* and *Cricotus*, gives the following results: The glenoid cavity is an excavation in two coössified elements, of which the inferior and posterior is probably coracoid. The latter is then much smaller than in *Reptilia* and *Batrachia anura*, but resembles that of the salamanders. The scapular arch proper, resembles that of the *Urodela*. The pelvis is intermediate between that of the anurous and urodelous *Batrachia*. There is no obturator foramen, and the common symphysis is deep. The humerus closely resembles that of the *Pelycosauria*, differing chiefly in the non-enclosure of the supracondylar foramen.



The resemblance of the scapular and pelvic arches of the *Pelycosauria*<sup>1</sup> to those of the *Batrachia* above described, is remarkable. In *Dimetrodon* and *Clepsydrops*, the principal difference to be observed in the pelvis, is the much stronger attachment of the ilium to the sacrum. In the scapular arch the principal peculiarity in the coössified portions, is the posterior double emargination of the coracoid. It is thus evident that in the Permian period there was a much closer approximation between the Batrachian, Reptilian and Mammalian types than at any later period.—E. D. Cope.

BUTHOTREPHIS FROM YORK COUNTY, PA.—Prof. Frazer has recently obtained specimens of *Buthotrephis flexuosa* from the Peach Bottom Slate quarries, near the Susquehanna river. The slate of this region, according to Prof. Frazer, is bounded, both above and below, by chlorites of great thickness, which have been heretofore regarded as lying much below the palæozoic rocks. As the *Buthotrephis flexuosa* is characteristic of the Hudson river epoch at the summit of the Lower Silurian, this discovery disturbs views previously held, and opens up new questions in the stratigraphy of the region.

THE COMSTOCK LODGE.—The scientific history of the Comstock has had three periods of development. First came in 1865, Von Richthofen, who had carefully studied the eruptive rocks of Transylvania, and was able to settle, once for all, the grand features of Washoe geology. He showed that the country rock of the Comstock was made up of four principal members, which are: diorite, at the base; propylite, overlying it; andesite, disposed in dikes through the mass of both these rocks; and finally trachyte, which seems to have no immediate connection with the diorite, but lies entirely in and upon the propylite. These four rocks were laid down in the order named. To this mass of information Mr. Clarence King, in 1870, added not only a careful discussion of the shape and occurrence of ore-bodies, but also the grand fact, not perceived before, that the lode lies upon one of the dikes of andesite. For the rest, it was supposed that the diorite had been injected as a dome into a mass of sedimentary strata, the remnants of which are still observable, and that it already formed a mountain peak before propylite, the succeeding rock, appeared. When the latter did come, it poured in irregular floods, covering the diorite mountain nearly or quite to its summit. The andesite was thought to have been injected into cracks broken through this vast mass of propylite; while the trachyte was looked upon as the real lode-maker.

The convulsions which attended its appearance were supposed to have opened a great crevice into which poured the waters from which the ore was deposited.

<sup>1</sup> See this Journal, 1878, p. 829.

Prof. John A. Church has recently written a book on "The Formation and History of the Comstock Lode." His account of Comstock geology differs essentially from this. He concurs with his predecessors in regard to the position and order of the rocks and the presence of a dike under the lode; but he gives to the rocks and to the lode itself a different history. He finds that the diorite and propylite are both stratified, and their strata are approximately conformable.

They were laid down in the horizontal position, and have been elevated into a mountain range by the ordinary operation of pressure and folding. The dikes of andesite have not broken through cracks opened across the other rocks, but are bedded, interposed between the strata of diorite and propylite. The openings between these strata were not originally so thick as the quartz seams now are. At first they were the merest partings between two layers of the propylite; and in accounting for the development of these insignificant crevices to ore-bodies two and three hundred feet thick, Mr. Church advances one of the most important observations of his book.

He takes the bold ground that the Comstock is not a true fissure vein; but that it has been formed by the process of substituting quartz for the propylite in certain localities, which were prepared for the process in a way described by him.

The lode lies on one of the andesite dikes, and the metal-bearing water rose up the face of this dike, and penetrated the propylite strata whenever they had been opened.

This water was siliceous, and attacked the propylite rock, dissolving it and depositing silica in its place. Each layer of propylite was attacked on two sides, until finally the whole layer was removed, and the two seams of quartz met. The layers of propylite are of all thicknesses, from a few feet up to many yards, and when a number of them were involved in the process of substitution, some would be completely removed, when others were only half dissolved away. If the process of substitution stopped at this stage, the result would be a mass of quartz inclosing streaks and layers of propylite, just as the structure is found to exist at the edges of the quartz bodies.—*Engineering and Mining Journal*.

#### GEOGRAPHY AND TRAVELS.<sup>1</sup>

ASIA.—Col. Prejevalsky having passed through Bulun-tochoi, up the Urungu river, crossed the southern Altai mountains to Barkul, arriving at Hami about May 30, 1879. Hami is at the extremity of the sandy steppe described as the Mouschoun Gobi; it is a desert almost destitute of vegetation with great tracts of clay covered with gravel. While the temperature of the air was as high as 38° C., the soil had sometimes a temperature of 68° C. The only animals of large size seen were the antelope and wild camel. Prejevalsky crossed this desert in a south-eastern

<sup>1</sup> Edited by ELLIS H. YARNALL, Philadelphia.

direction for 232 miles to the oasis of Sha-chau—about E. long.  $94^{\circ}$ , lat.  $39^{\circ}$ <sup>1</sup>—reaching there on the 20th of June. He states that the desert attains at one point an elevation of 5000 feet, but that the Sha-chau oasis, which he describes as very fertile, is only 3500 feet above the sea. Southwards there runs a range covered with perpetual snow, and evidently to be identified with the Altyn-tagh of his former journey to Lob-Nor. It is here joined by the Nian-Shan of Koko-Nor. This portion of Mongolia being very little known, it is likely our knowledge of it will be much increased. The latest news of this intrepid traveler comes by way of Pekin, and reports him as having reached the southern part of the province of Tsaidam on the northern frontier of Tibet. The route from there to Lhasa is known, partly through Prejevalsky's own researches in 1872, and partly from Huc and Gabet's journey.

Count Széchényi having, as stated in the *NATURALIST* for November, 1879, been obliged to abandon his attempt to cross the Kum Tagh to the Lob-Nor, made a journey southwards from Su-chow-fu, visiting the high range forming the northern boundary of the plains of Tsaidam. Then returning to Su-chow-fu he proceeded south-easterly to Si-ning-fu through a mountainous region constituting the basin of the river Tatung, a tributary to the Yellow river. These mountains attain the limits of perpetual snow and are called Nan Shan. Si-ning-fu is situated at the foot of lofty snow-clad mountains (14,500 feet), in a well cultivated country, and is the principal depot of the rhubarb trade between China and Russia. He next endeavored to reach Lhasa by the direct route over the high plateau of Tibet, the road followed by Père Huc, but could not advance further than the Odantala plain where the Yellow river rises. The party left Si-ning-fu on August 12, 1879, and reached Cheng-tu-fu, the capital of Szechuen, at the beginning of October. This route is quite unknown, and passes over the water-sheds of the two great rivers, the Yellow and the Yang-tse-kiang. Széchényi's arrival on the 24th of October at Ta-chiën-lu has been reported at Pekin. Notwithstanding the efforts of the Chinese to dissuade him from continuing his journey into Tibet and the reported hostility of the natives of that country, he, when last heard from, was continuing his journey to Batang and Lhasa.

The immense coal fields of China are slowly being developed. On the upper Yang-tse-kiang a coal field has been found extending over seventy-five square miles. In one bed lying only a hundred feet from the surface at least 1,200,000 tons of anthracite have been exposed.

The *Academy* states, on the authority of the British Consul at

<sup>1</sup> The best map on which to trace this portion of Prejevalsky's route we have found to be Tafel 1, *Petermann's Mittheilungen*, 1876, showing his previous journey in 1870-73 —EDITOR.

Saigon, Cochin China, that the natives of the country, especially in the more northern districts of Indo-China, have the great toe of the foot separated from the others like the thumb of the hand, so that it can be used, in a limited degree, in the same way. This peculiarity is mentioned in Chinese annals so far back as 2300 B. C.

Several Russian travelers have recently made important explorations in Central Asia. M. Potanin has solved many important questions connected with the geography of north-western Mongolia and made valuable natural history and ethnological collections. M. Severtsof has, by a recent exploration of the Pamir, made considerable additions to our knowledge of its physical and geographical features. Some of the peaks in the Pamir were found to be of great height—the Mustagh attaining an elevation of 25,800 feet. The snow line was found to be at 14,000 feet on the northern, and at 19,000 feet on the southern slope of the mountains.

M. Oshanin describes a visit to the upper part of the Muk-sou, a tributary of the Surkhab river. From a notice of his paper in *Nature* we learn that very high peaks inclose the deep valley of this stream, the bottom of which is 8000 feet above the sea level. The Sandal peak is 25,000 feet high. These peaks are covered for two-thirds of their height with snow, and immense glaciers flow from their wide amphitheatres into the valley of the Sel-su river and those of its tributaries. They form together a glacier which descends very low, its lower extremity, one and a-half miles wide, being met with at a distance of fifteen miles from Altyn-mazar at the confluence of the Sel-su, Luk-su and Kainda rivers. The length of this glacier is not less than twenty to twenty-five miles, and it is fed with several other glaciers of very large size. The oscillations in its length have a great importance, as sometimes it advances so far into the valley as completely to bar up the valley of the affluent of the Sel-su, the Baland-kiik; this last thence forms a wide base which afterwards cuts through a passage in the ice and inundates the main valley, destroying the forests. The vegetation in the neighborhood of the glacier is very poor, whilst the lateral valley of the Baland-kiik is covered with rich forests and grass, though far higher than that of the Sel-su. M. Oshanin observed immense quantities of the *Microplax interrupta* Fieb., in the neighborhood of Altyn-mazar. This *Oxyccerina*, which is characteristic of the southern parts of the palæarctic region in Europe, reaches in Central Asia such heights as, in the Alps and Pyrenees, are occupied with representations of the Arctic zone.

M. Fetissoff, the director of the Botanical Garden at Vernoe, has demonstrated that the supposed volcanoes in the Kuldja district are really coal beds in a state of combustion.

Another Russian explorer, M. Pyetsoff, has traveled from

Kobdo to Kalgan, and thence to Ulassoutai via Urga, in Mongolia. From Ulassoutai he turned west to the Chuyra river, which was reached at Kosh-agach. Nearly the whole of this journey was through unexplored territory. No less than 2700 miles were surveyed and twenty-six points determined astronomically as well by chronometer as by occultations. Barometrical measurements were made during the whole journey, and very rich zoölogical, botanical and mineralogical collections were obtained.

Bangkok, the capital of Siam, is to be united to the telegraphic system of the world by a partly overland and partly submarine line connecting with the one now running to Moulmein.

M. W. Shapira sends to the *Athenæum* (March 13, 1880) an interesting account of a journey of four months during the summer of 1879 in the interior of Yemen, the Arabia Felix of the Romans. He describes it as the most fertile and temperate country on this side of Asia, owing its happiness chiefly to the absence of the Shumum winds—the great curse of Syria and Northern Africa—and its prosperity to its having two rainy seasons of four months each, and consequently two harvests in the year. The mountains make the climate temperate and healthy. Yemen has an area of about 50,000 miles, more than half of which belongs to a series of plateaux from 4000 to 8500 feet above the level of the sea. The boundary line of Yemen is as follows: western side, along the eastern side of the Red sea, from Bab-el-Mandab south to Lohaya north; then north side, from Lohaya north-west to Saada north-east; then from Saada north-east to Aden south-east; then from Aden south-east to Bab-el-Mandab south-west, so that it forms an oblong square of about 110 to 150 miles wide and 450 long. The chief towns of Yemen are situated on the second plateau, from 6000 to 7000 feet above the sea. This plateau is fertile and well watered.

#### MICROSCOPY.<sup>1</sup>

ORGANISMS IN ICE FROM STAGNANT WATER.—During the past season on account of the unusually mild weather, ice has been gathered quite extensively from stagnant water in canals and ponds. Since the middle of February I have been making microscopical investigations with regard to the purity of such ice. The plan adopted has been to select only those fragments taken from the interior of blocks which appear clean and transparent to the unassisted eye. On melting those fragments and examining the water thus obtained with various magnifying powers up to 900 diameters, bits of vegetable tissues and confervoid growths are usually recognizable at once. I have not noticed animalculæ in an active state in water from ice that has just been melted, but upon allowing such water to settle and become warm at the or-

<sup>1</sup> This department is edited by Dr. R. H. WARD, Troy, N. Y.

dinary temperature of a room occupied for living purposes, the sediment deposited may be found to contain, after some hours, monads whose movements are easily discernible with a magnifying powers of from 200 to 400 diameters. Upon allowing the water to stand still longer I have found the *conservæ* growing thriftily, and in some instances forming clusters or bundles frequented by minute animalculæ, the entire appearance in this case being very similar to that presented by the nests occupied by the young of the common *Paramecium* which I have seen in stagnant water. As the result of these investigations I am fully convinced that freezing does not free water from filth due to the presence of sewage or decaying vegetable matter, and further, that it is altogether probable that the germs from which animalculæ are developed, if not the animalculæ themselves in a quiescent state, are present in very much of the ice taken from stagnant water. This being the case, it would seem that the use of such ice in drinking water is hazardous, to say the least.—*M. A. Veeder, Lyons, N. Y.*

AMERICAN SOCIETY OF MICROSCOPISTS.—The Executive Committee of this Society has decided upon Tuesday, August 17th, as the date of the coming meeting at Detroit, which is expected to continue four days. Ample arrangements are already being made for the entertainment of the Society by the local Microscopical Club.

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### SCIENTIFIC NEWS.

— EDITORS NATURALIST.—The severe criticism upon a short paper on the Entomostraca, which I published in the Report of the Minnesota Geological Survey, seems to admit of a reply.

The writer is not uncognizant of numerous faults in the paper, but is not willing to renounce the hope, expressed in the preface, that it will be of some slight service to those for whom it was designed.

The reviewer seems to ignore the design of the paper and the avowal of the author, which cover most of the points criticised.

It was intended as an aid to those who are interested in such humble forms, but are unable to secure the numerous foreign works necessary to obtain a complete view of the group.

The definition of the new species was but an incidental feature.

The names of the sources of information used are, for the most part, mentioned in the preface, so it is obvious the harsh criticism on this point is uncalled for.

The statement that no credit is given for facts and bibliographical lists is covered by that fact, and the instance cited (*Daphnia pulex*) does contain references to Baird's work.

The animus of the criticism is visible in the fact that the reviewer deplores the absence of reference, in one case at least, to

works not published at the time the MS. was submitted. If it be a crime for an almanac to differ from an encyclopedia, there are many sinners. If the paper had been intended as a revision of the classification rather than a mere annotated list with references to such works as were consulted for assistance of amateurs, the severity might seem merited.

Finally, typographical errors are to be greatly regretted, and the genius of the compositor who renders *gnathites* qualities, borders on the sublime, yet any one who has attempted to secure a correct rendering of scientific names from compositors unfamiliar with them, will readily understand that the lack of opportunity for second reading of proof might cover many sins; however, Mr. Kingsley has compiled a quite complete list of errata, covering the important errors.

In conclusion the writer would add that the paper was collected from notes gathered at different times for another purpose, and the material was given its present form for reasons mentioned, and not without the advice of those of greater experience.

The present intention is to continue the study with the assistance of works which unfortunately came too late to be used in the preparation of the paper, and assistance and advice is solicited and will be reciprocated as far as possible.

My thanks are due Mr. Kingsley for his attempt to correct any errors which might mislead, and are respectfully tendered.—C. L. Herrick.

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## PROCEEDINGS OF SCIENTIFIC SOCIETIES.

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA, Jan. 13.—Prof. C. N. Pierce and E. D. Cope were dropped from the council on account of absence from more than six of the meetings; Prof. Cope having been engaged in a scientific exploration in Oregon. Their re-nomination was refused on the ground that the exclusion from the council is of the nature of a penalty for the absence in question.

Dr. H. C. Chapman remarked on the genito-urinary organs of *Capromys piloroides* (clitoris perforated by the urethra), and on the occurrence of *Cysticerci* in the Macaque.

Jan. 18.—In response to a resolution of the Academy, the following communication from Prof. Cope was read:

DR. E. J. NOLAN.

Sir:—Yours of the 14th inst. containing a copy of a resolution of the Academy of Natural Sciences, is received. The resolution requests a statement of the grounds on which were based certain assertions which I have made in the *Philadelphia Record* for Jan. 8th, 1880. I take great pleasure in furnishing the desired information, as follows:

First statement. "It may be remarked that at the late election



the reform party polled more votes than at any previous election (48 votes)." Explanation: John S. Haines, one of the candidates of the reform party, received according to the official count, furnished me by a reliable person, forty-two votes by the ballots on colored paper, and six votes by the ballots on white paper, which were thrown out by the tellers.  $42 + 6 = 48$ . I take as a test of the previous strength of the reform party the vote on the final passage of the present by-laws, by which the professorships were established. After an open discussion of five months they were adopted by a vote of not more than thirty yeas and only two nays.

Second statement. "That they" (*i. e.* the reform party) "elected three out of their five candidates." The three candidates nominated by members of the reform party who were elected, are Dr. A. J. Parker, Edward Potts and Rev. H. C. McCook.

Third statement. "One of whom however" (*i. e.* one of the candidates of the reform party who was elected) "has been irregularly superseded." By this I intended to refer to the fact, that Dr. R. S. Kenderdine, having withdrawn from the candidacy for the position of curator in entire accordance with parliamentary law, was no longer a candidate. That the placing of his name on the ticket at a subsequent meeting by a ruling of the president, was an arbitrary act, done contrary to the continued ruling of the same president for years past, which has not permitted the placing of any name in nomination for office after the last Tuesday in November. To say then that Dr. A. J. Parker has been "irregularly superseded," is to state in the mildest language, a position of affairs, which it is hoped will be, in the interest of fair dealing, soon remedied. I am very truly yours, E. D. COPE.

Verbal remarks by Dr. Leidy on the occurrence of *Filaria immitis* in the dog. Mr. J. A. Ryder remarked on the utilization of electricity for the purpose of instantly killing mollusks in a fully extended condition.

Feb. 3.—Mr. J. A. Ryder spoke on the nucleus of the eggs of limpets, *Crepidula fornicata*.

Feb. 10.—Dr. H. C. Evarts remarked on the occurrence of *Cercaria hyaloecauda* Hald.

Feb. 24.—Dr. Leidy described some Naid worms—*Aulophorus vagus* and *Pristina flagellum* named. Mr. J. S. Kingsley on the holothurian genus *Kolga*.

Mar. 2.—Dr. Leidy remarked on *Dytiscus* and *Mactra*; also, on *Filaria restiformis*, a new human parasite, 26 inches long. Mr. J. S. Kingsley on the structure of the eyes of *Limulus*.

Mar. 9.—Dr. Coates made a verbal communication on some ancient Peruvian pottery exhibited by him. Drs. Coates, Leidy and LeConte, on the ancient Cyclopean structures of Peru, Egypt, etc. Mr. J. A. Ryder described two myriapods, *Scolopendrella notacantha* and *S. gratia*, nov. sp.; also, some remarks on the position of the chlorophyll grains in certain *Vorticellæ*.

The following papers have been presented for publication:—  
Jan. 6. "On the Nudibranchiate Gastropod Mollusca of the North Pacific ocean, with special reference to those of Alaska," by Dr. R. Bergh of Copenhagen, Part II.—"The Terrestrial Mollusca inhabiting the Cook's or Harvey islands," by Andrew Garrett.  
Jan. 27. "Carcinological Notes, No. 2; Revision of the *Gelasimi*," by J. S. Kingsley. Feb. 17. "A description of a new Crustacean from the Upper Silurian of Georgia, with remarks upon *Calymene clintonii*," by A. W. Vogdes. Feb. 24. "*Pelagic Amphipoda*," by T. Hale Street, M.D., U.S.N.—"Carcinological Notes, No. 3," by J. S. Kingsley. Mar. 9. "Check-list of the Maioidea of the Pacific coast," by W. N. Lockington.

CALIFORNIA ACADEMY OF SCIENCES, Feb. 16.—A complete catalogue of the Fungi of the Pacific Coast, compiled by Dr. H. W. Harkness and Justin P. Moore, was presented. An article by Justin P. Moore was read on "Edible Fungi." W. W. Lockington read an article entitled, "Is Evolution Immoral?"

NEW YORK ACADEMY OF SCIENCES, March 22.—Mr. I. C. Russell remarked on the former extent of the Triassic rocks of the Atlantic slope.

BOSTON SOCIETY OF NATURAL HISTORY, March 17.—Dr. M. E. Wadsworth discussed the iron ores of Lake Superior and their associated rocks.

AMERICAN GEOGRAPHICAL SOCIETY, March 23.—Chief Justice Daly delivered the annual address upon the geographical work of the world in 1878 and 1879.

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#### SELECTED ARTICLES IN SCIENTIFIC SERIALS.

AMERICAN JOURNAL OF SCIENCE AND ARTS.—March. The old river beds of California, by J. Le Conte. Note on the age of the Green mountains, by J. D. Dana. Western limits of the Taconic system, by S. W. Ford. Principal characters of American Jurassic Dinosaurs, by O. C. Marsh.

AMERICAN JOURNAL OF SCIENCE.—April. History of some Precambrian rocks in America and Europe, by T. Sterry Hunt. Synopsis of the Cephalopoda of the Northeastern coast of America, by A. E. Verrill.

JENAIISCHE ZEITSCHRIFT FÜR NATURWISSENSCHAFT.—January 31. The brain of *Ammocoetes* and *Petromyzon planeri*, with especial reference to the spinal-like brain nerves, by R. Wiedersheim. The skeleton of *Pleurodeles waltli*, by R. Wiedersheim. O. and R. Hertwig continue their researches on the anatomy and histology of the Actinians. Special and general studies on the morphology and development of the Hydra, by W. Haacke.

ZEITSCHRIFT FÜR NATURWISSENSCHAFTLICHE ZOÖLOGIE.—March 1. The article of most general interest is by E. Nauck on the hard parts of the stomach of crabs.

